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ORIGINAL MEMOIRS.

A CASE OF BILATERAL TEMPOROMAXILLARY ANKYLOSIS WITH AN ORIGINAL METHOD FOR APPROACHING THE TEMPOROMAXILLARY ARTICULATION.

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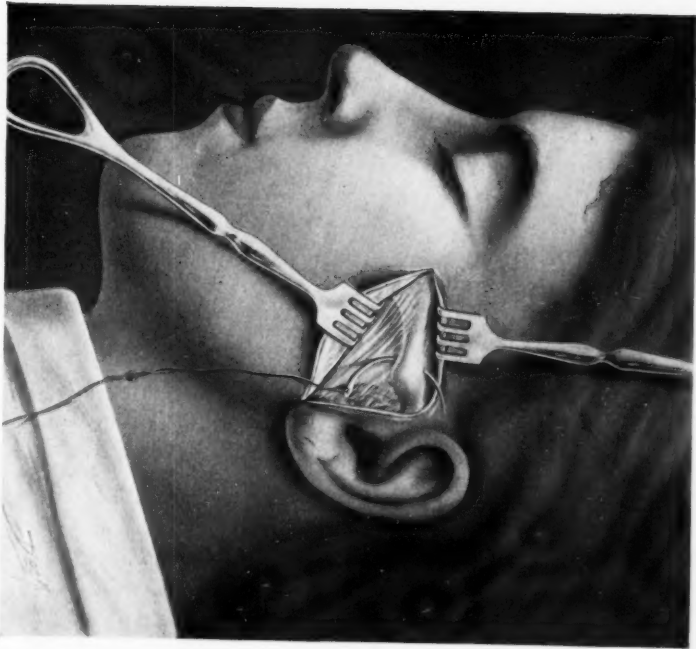
FANNY M., eighteen years old, came to me on December 16, 1905. She was indeed a pitiable object. Eight years before, when a child of ten, she fell, striking violently upon her chin. There was a great deal of pain, not at the chin but in the region of the temporomaxillary joints. From that time the lower jaw ceased to develop and it became impossible to separate the teeth. Three years after the injury an attempt was made to force the jaws with a screw-gag. This was unsuccessful. In order to facilitate the ingestion of fluid, the only form in which food could be taken, the poor girl had had her two upper and two lower incisors extracted. Her face had the characteristic "bird-like" appearance which accompanies temporomaxillary ankylosis dating from childhood.

On searching through the literature I was surprised at the number and complexity of operations which had been devised for the relief of this condition, and to note that all appeared formidable, and that there was considerable danger of permanent injury to the branches of the facial nerve. On thinking the problem over it appeared to me that the nerve at any rate need not be injured, and that an easy route of approach might be feasible. A little study with the skull convinced me that the method

which I had devised was worth trying. Accordingly on December 20, I operated upon the left side. Our greatest concern in this case was with the general anæsthesia. It must be remembered that the patient's jaws were absolutely locked, and that in the event of embarrassment of respiration the tongue could not be drawn from the mouth, and should vomiting occur there would probably be great danger of aspiration pneumonia. We therefore prepared our patient most thoroughly with more than the usual time of starvation, and administered a hypodermic of a full dose of morphine a half hour before the operation. Fortunately narcosis was quiet and without accident.

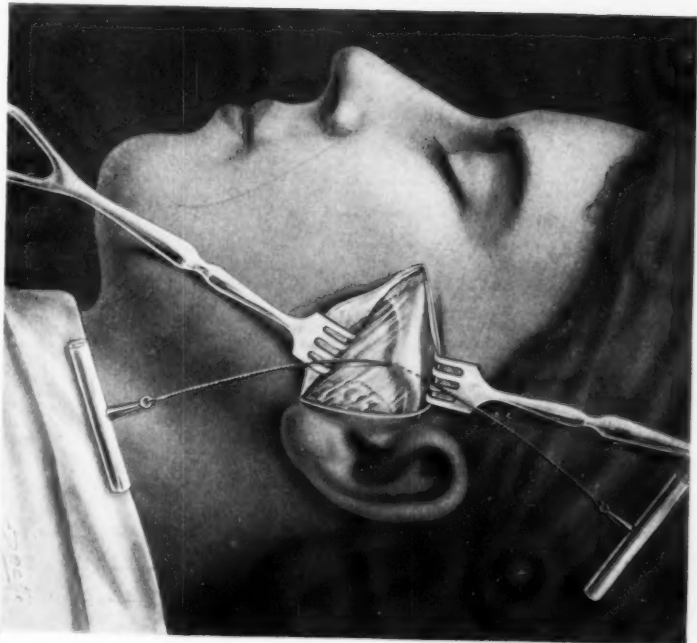
The operation was then performed by the following method: An incision down to the periosteum was made along the zygoma from just in front of the auricle; then from the beginning of this incision, at the point nearest the ear, a second incision was carried through the skin alone, running vertically down for about $1\frac{1}{2}$ inches toward the angle of the jaw. As stated, this vertical incision divided the skin alone and did not injure any of the subcutaneous structures. The loosened triangular flap was now dissected off and turned downward and forward. A curved hæmostatic needle threaded with coarse silk was inserted just below the posterior portion of the zygoma and passing behind the arch at this point emerged just above it (Fig. 1). A needle similarly threaded was passed in the same manner under the anterior part of the zygoma. A fine Gigli saw was drawn through by means of the posterior thread, and the zygoma with its periosteal covering was divided by a bone section which ran upward and backward. Similarly the anterior portion of the zygoma was divided by a section running upward and forward. The loosened section of zygoma was now drawn downward together with the attached masseter muscle and the other soft parts, carrying with it a part of the parotid gland and fibres of the facial nerve (Fig. 3). This manœuvre exposed the region of the ankylosis perfectly. There was not a vestige of the temporomaxillary articulation. I found a considerable exostosis from the neck of the bone which fused with the surrounding osseous tissue. With a narrow gouge and a strong curette the remains of the distorted condyle and neck were taken away. The ankylosis of the other side, however, prevented more than a slight widening of the oral opening. Laying the osteoplastic flap of the zygoma back in its original posi-

FIG. 1.



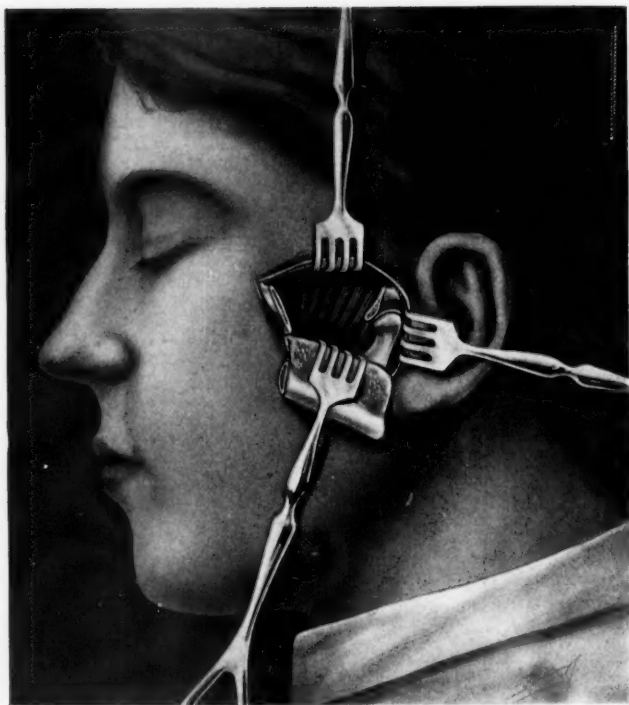
The skin incision, showing also the needle, passed under the zygoma for carrying through the wire saw.

FIG. 2.



Wire saw in position. The dotted line anteriorly indicates the plane of the second bone section.

FIG. 3.



The zygoma with its attached masseter drawn downward exposing the temporal fossa. The posterior retractor, a blunt one, draws aside the soft parts, nerves, etc., *not* shown in this diagrammatic illustration.

FIG. 4.

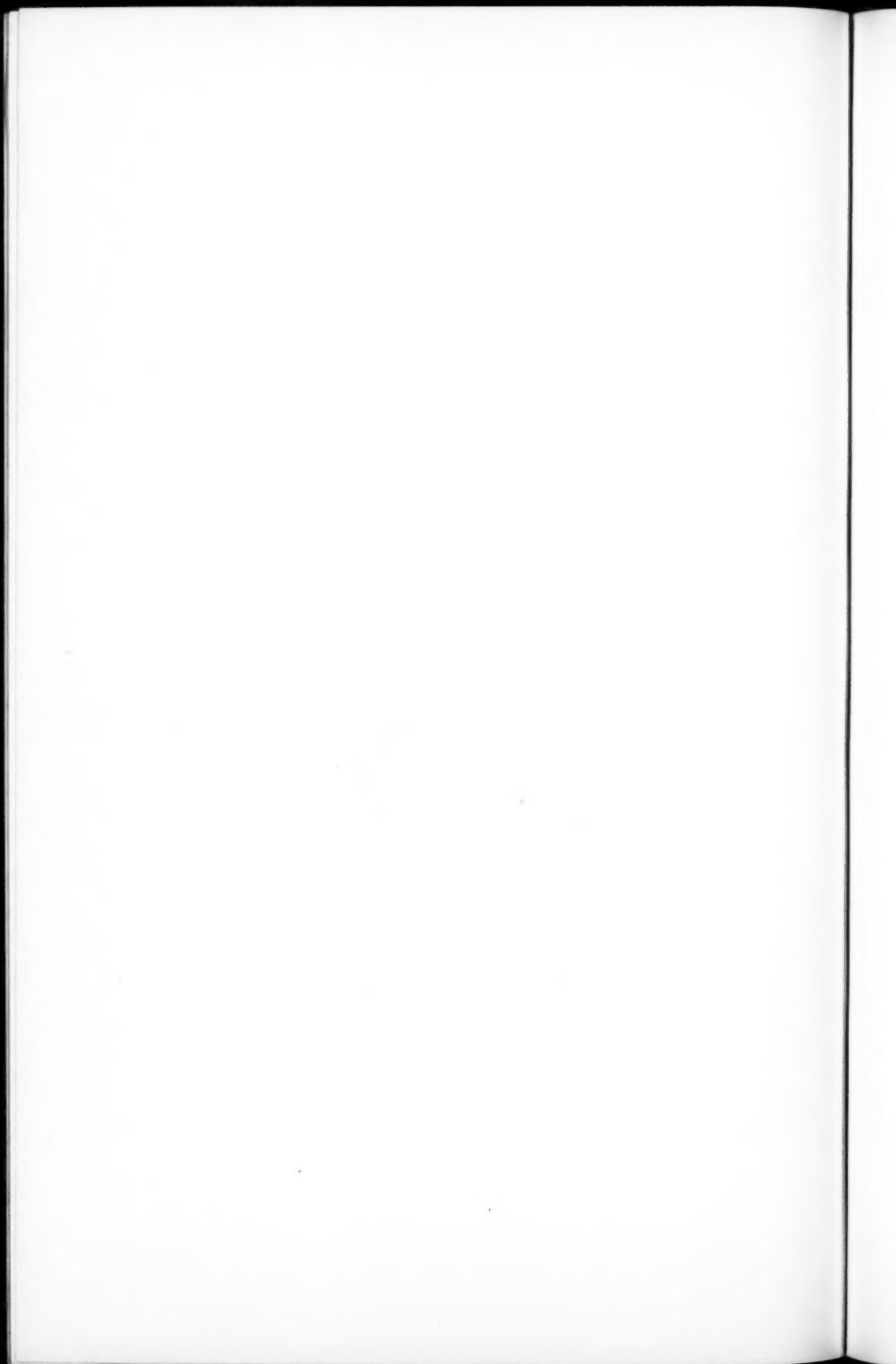


The patient, F. M., showing deformity following bilateral fracture of the neck of mandible with ankylosis.

FIG. 5.



Final result of operation, illustrating function.



tion, I found that the normal contraction of the masseter held it in place without wire or other mechanical device, the bevel of the bone sections wedging the loose fragment closely into place. The skin flap was now sutured and the patient sent back to the ward. The entire procedure had consumed less than a half hour.

Nine days later the patient was again anesthetized and a similar operation performed still more easily on the right side, when there was immediate unlocking of the jaw. There was primary union on the right side and immediate union on the left, but later a slight suppuration occurred here which in some way was connected with the left ear, the drum of which perforated and discharged pus. At no time, however, was there any alarming symptom. Functional recovery was perfect so that within two or three weeks she could exert sufficient power to eat a raw apple, separating the teeth widely and biting into it in a perfectly normal manner.

In order to prevent the possible recurrence of ankylosis, Dr. P. Fiaschi, who was at the time a member of the house staff of Mt. Sinai Hospital, made an interdental appliance for the patient to wear at night, so that she slept with her mouth wide open. She was discharged January 27, 1906, with a perfect functional result, and for a number of months I kept track of her, noting with satisfaction her freedom from recurrence. Artificial teeth bridged the unsightly gap left by the dental extractions.

This operation appears to me so simple and easy of execution, and the resulting cicatrix so insignificant, that I would recommend it not only in cases like the foregoing, but whenever the temporal or the zygomatic fossa is to be invaded. The temporosphenoidal region could probably also be approached in this way. In my case there was not the slightest evidence of injury to the facial nerve, nor was it necessary to suture the osteoplastic flap into position. The plane of section, while described as upward and backward and upward and forward respectively, also ran in such a direction as to wedge firmly on pressure from without. While it will be seen that sutures are thus unnecessary, still, if for some reason it has not been possible to make section exactly as described, one or two fine chromic gut stitches through periosteum will hold the zygoma where it belongs.

VARIATIONS IN THE ANATOMY OF THE NASO-LACHRYMAL PASSAGES.

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IN the course of a recent investigation of the nasolachrymal passages, my attention was directed to the variations that exist in the gross anatomy of the adult nasolachrymal duct. Since some of these variations have a direct practical bearing, I wish in this communication to briefly refer to them. The detailed study of the embryology, gross anatomy, and variations of these passages will be published in a later paper.

In order to make the several portions of the nasolachrymal passages more comprehensible and to show some of the variations, I herewith present photographs of blotting-paper reconstructions of two adult nasolachrymal passages (Figs. 2, 3, and 4). It must be remembered that the reconstructions represent cavities and are, therefore, casts of the nasolachrymal passages.

The nasolachrymal passages consist of the following parts: (a) the ductus lacrimales (lachrymal canaliculi); (b) the saccus lacrimalis; (c) the ductus nasolacrimalis.

The Lachrymal Ducts.—The lachrymal ducts consist of vertical and horizontal portions. These portions are well illustrated in the figures accompanying this article. Note in both reconstructions that the inferior lachrymal duct is longer than the superior duct, but that there is a much greater difference between the two ducts represented in Figs. 2 and 3 than in the two ducts represented in Fig. 4.

The superior lachrymal punctum is almost invariably nearer to the medial palpebral commissure (internal canthus) than is the lower punctum—the distance varying in different individuals. This characteristic, *i.e.*, the lower punctum

farther removed from the medial palpebral commissure, is already indicated in the early embryo (Fig. 1). The positions of the lachrymal puncta on the lachrymal papillæ vary. They are usually placed at the summit of the papillæ, but they are at times located some distance from the summit on the side.

At the junctions of the horizontal and vertical portions of the lachrymal ducts, we find rather marked dilatations, the ampullæ of the ducts. These ampullæ vary in size in different individuals, and in both reconstructions figured in this article the ampulla of the superior duct is somewhat larger than that of the inferior duct.

The horizontal portions of the lachrymal ducts communicate with the lachrymal sac in varying ways: (a) the ducts may unite into a short, narrow, common duct and this in turn establish communication between the lachrymal ducts and the lachrymal sac (the usual way of communication); (b) the ducts may empty separately into an apparent diverticulum of the lachrymal sac—the superior sinus (Maier) of the lachrymal sac (this diverticulum could, however, be thought of as a wide common duct of the lachrymal ducts); (c) the ducts may rarely empty separately into the lachrymal sac, *i.e.*, there is neither a common duct nor a diverticulum from the lachrymal sac.

The Lachrymal Sac.—The lachrymal sac varies much in size in different individuals. In many cases it passes imperceptibly into the nasolachrymal duct, and its inferior limit can, therefore, be only arbitrarily determined. In both of the reconstructions, however, the limits of the lachrymal sacs are well established. In Fig. 2 the sac is well isolated from the nasolachrymal duct. Note that a portion of the lachrymal sac projects below the point of communication of the sac with the nasolachrymal duct. In such conditions, it would be difficult to pass a lachrymal probe from the lachrymal sac into the nasolachrymal duct because of the rather devious course of this communication. In the nasolachrymal duct represented in Fig. 4, the point of communication between the sac and the nasolachrymal duct is constricted. The con-

striction is, however, a gradual one, and such a condition of the anatomy is certainly conducive to the easy passage of the lachrymal probe at this point.

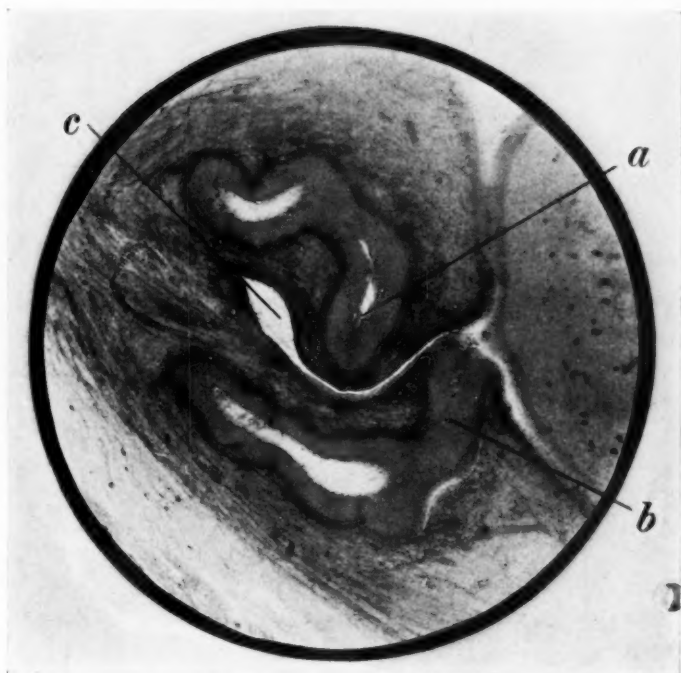
There is considerable variation in the extent of the lachrymal sac above the point of entrance of the common lachrymal duct. In some cases the fundus of the sac is approximately at the level of the opening of the common lachrymal duct, *i.e.*, the latter duct opens into the most cephalic point of the sac. In other instances the summit of the lachrymal sac extends from 1 to 8 mm. above the ostium of the united lachrymal ducts.

The Nasolachrymal Duct.—Of the several portions of the lachrymal passages the nasolachrymal duct presents, according to my investigations, the greatest variations (excluding congenital errors), and it is to this duct that I wish especially to direct attention. For some years I have noticed marked differences in cadavers in the gross anatomy of the nasolachrymal duct. These differences I find are largely due to diverticula of the duct. They occur at any portion of the duct and vary greatly in size and shape.

In Figs. 2 and 3 we have the representation of an adult nasolachrymal duct which is extremely irregular. Note especially the many constrictions and the rather large diverticula from different portions of the duct. Note also the manner of communication between the lachrymal sac and the nasolachrymal duct. The latter communication, the marked constrictions of the nasolachrymal duct at various points, the somewhat tortuous course of the duct, and the comparatively large diverticula from the duct are the points in the gross anatomy of this adult duct that would make the procedure of probing a difficult one. False passages could easily be made and probably often are when such irregularities prevail. These irregular ducts, when infected, would be difficult of treatment, because of the retention of infectious material in the diverticula.

On the other hand, many ducts are quite regular in outline and correspond to the duct generally figured in the text-books. In Fig. 4 we have the representation of an adult

FIG. 1.



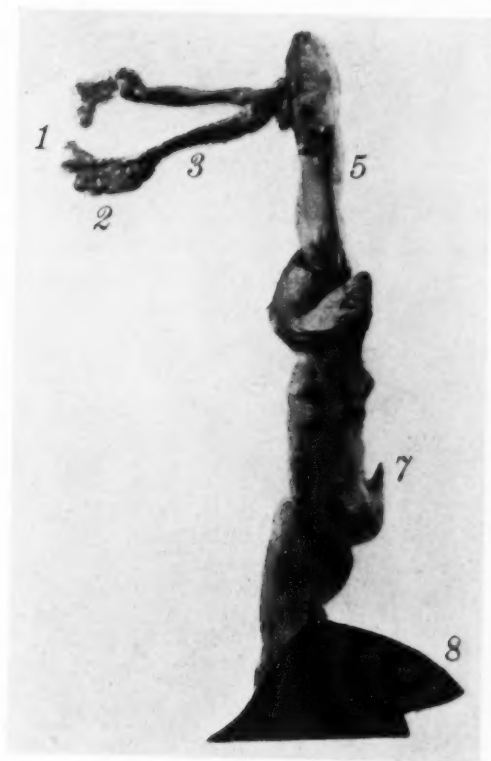
Photomicrograph of a section through the ductus lacrimales (lacrimal canaliculi) from a human embryo aged 120 days ($\times 31$). Note that the ducts have not yet established lumina at all points, but at some places represent solid cords of epithelial cells. Especially note that the inferior lacrimal duct is longer than the superior duct, *i.e.*, the inferior lacrimal punctum is located lateral to the punctum of the superior eyelid. This characteristic is always present in the adult. *a*, superior lacrimal duct; *b*, inferior lacrimal duct; *c*, nasal end of the palpebral fissure.

FIG. 2.



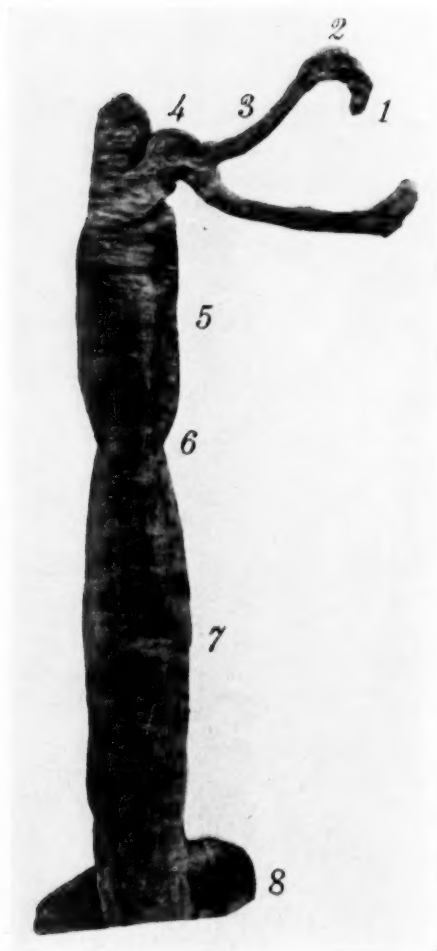
Photograph of a reconstruction of the nasolachrymal passages of an adult female, aged 60 years ($\times 3.8$). Note especially the marked irregularities in the nasolachrymal duct, the rather large diverticula from the duct, and the manner of communication between the lachrymal sac and the nasolachrymal duct. 1, vertical portion of lachrymal duct; 2, ampulla of lachrymal duct; 3, horizontal portion of lachrymal duct; 5, lachrymal sac; 6, point of communication between lachrymal sac and nasolachrymal duct; 7, nasolachrymal duct; 8, portion of the inferior nasal meatus.

FIG. 3.



Another view of the same reconstruction shown in Fig. 2. This figure illustrates the diverticula better. The reference numbers are the same as in Fig. 2.

FIG. 4.



Photograph of a reconstruction of the nasolachrymal passages of an adult male aged 55 (?) years ($\times 3.8$). Compare the regularity of the nasolachrymal duct represented in this figure with the irregularity represented in Figs. 2 and 3. 4, the common lachrymal duct which establishes communication between the lachrymal sac and the lachrymal ducts. The other reference numbers are the same as in Fig. 2.

nasolachrymal duct which presents regular outlines. The junction of the duct with the lachrymal sac is somewhat constricted, but this constriction would offer no obstacle to the passage of the lachrymal probe. The only irregularity of any account is a small diverticulum from the caudal portion of the duct, and this is quite insignificant.

The Ostium of the Nasolachrymal Duct.—The ostium of the nasolachrymal duct is, according to my investigations, invariably located on the lateral wall of the inferior nasal meatus. Geddes, however, reports an interesting abnormality in an Irish male subject in which the nasolachrymal duct opened into the middle nasal meatus, a short distance below the hiatus semilunaris. The ostium varies in its location on the lateral wall of the inferior meatus; it also varies greatly in size and shape.

It is located from 15 to 20 mm. dorsal to the limen nasi and from 30 to 38 mm. from the nares (anterior nares). It is frequently found at the most superior part of the inferior meatus, *i.e.*, immediately inferior to the point of attachment of the inferior concha to the lateral nasal wall. On the other hand, the ostium may be located comparatively far inferior to the above mentioned point. The distance varies from 0 to 9 mm. The position of the ostium has a marked effect on the length of the nasolachrymal duct.

The ostium varies greatly in shape. It may be slit-like, the nasolachrymal duct passing more or less obliquely through the nasal mucous membrane. In these cases, the opening is usually guarded by folds of mucous membrane. Occasionally these slit-like ostia are located with difficulty. Pressure on the lachrymal sac usually forces some fluid through the ostium, and in this way it is more readily found. The slit is usually directed vertically, but may assume a more or less horizontal position.

Again we have specimens in which the nasolachrymal duct passes through the mucous membrane rather obliquely, but in which the ostia are not slit-like in character. They are usually more or less overhung by folds of mucous mem-

brane. From the openings, gutter-like channels continue inferiorly for some distance on the lateral nasal wall.

A large number of specimens present ostia that are not guarded by folds of mucous membrane. They present wide, open, unguarded mouths. These ostia are usually found communicating with the inferior meatus immediately inferior to the attached border of the inferior concha, *i.e.*, at the most superior point of the inferior meatus. This type of ostium is readily located and probed with ease—contrasting greatly in this respect with the slit-like ostia and all of those guarded by folds of mucous membrane.

I recently measured a series of ostia and found them to vary from 1 to 6 mm. at their widest point. In many cases the ostium is only a potential opening in that the folds of mucous membrane are collapsed and only open when pressure is made on the lachrymal sac and fluid forced through the ostium into the inferior meatus.

In some instances the nasolachrymal duct communicates with the meatus inferior by two ostia. This anomalous condition is readily explained by the embryology of the duct.

THE NERVE SUPPLY OF THE ANTERIOR ABDOMINAL WALL AND ITS SURGICAL IMPORTANCE.

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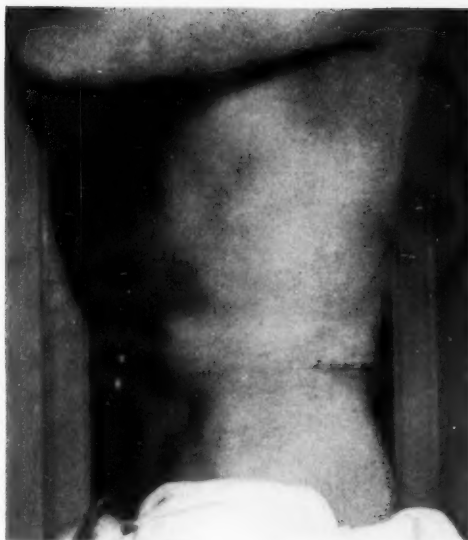
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THE anterior abdominal wall is a region attacked by the general surgeon and gynæcologist with such frequency that it would seem as though it should be the most familiar. When we come to consider the situation, however, we find that it is not so. In doing an ordinary laparotomy, the operator goes into the abdomen without giving a thought to the structures through which he is making his way, whether it be through the linea alba, in the right lower quadrant, or through the dorsilumbar muscles. The idea seems to be fairly well fixed that it is best to make incisions between muscle bundles rather than to cut them, and yet how rarely do we see operators going a little out of the way to avoid one of the nerves which courses through the muscles of the abdominal wall. In operating on one of the extremities, there is not any one that would not be watchful in the region of the median nerve in the arm or the anterior crural in the leg. These latter, however, are of no more importance than those that are seen, yet cut in the ordinary right rectus incision for a stone in the gall-bladder or in the dorsilumbar incision for a stone in the kidney. It is questionable whether the importance of the lower thoracic and upper lumbar nerves is fully appreciated by most surgeons, and yet every one of these nerves is, in greater part, a motor one, and though supplying a relatively small amount of muscle tissue, each supplies a certain segment, which, when paralyzed, is perfectly apt to become flaccid enough for the passage of a ventral hernia. This latter is often a greater trial to the patient than the original trouble for which he was operated upon. An abdominal belt or support is rarely of any real benefit. It serves in only a slight measure to alleviate the

mistrust which the patient has in his abdominal muscles, and when this mistrust is increased by the ever-present fear of an intestinal strangulation, life really becomes such a burden that the patient is most insistent on another operation to put him in good condition. When we consider that these ventral hernias are in otherwise perfectly strong men and women, who except for this disability would be able to do heavy physical labor, we can in some measure appreciate the importance of preserving, by a small amount of extra care and time, the few nerves one encounters in doing an ordinary laparotomy.

On the other hand, we know that in certain cases, where there has been a ruthless sectioning of nerves, paralysis of the abdominal wall and subsequent hernia does not follow. In a very thorough treatise on malignant tumors of the testicle, Chevassu of Paris, in the *Revue de Chirurgie*, for May, 1910, describes a radical operation for the removal of the testicle and the secondarily involved lumbar glands, in which an incision is made from the last rib to the crest of the ilium along the edge of the quadratus lumborum, thence parallel and slightly above Poupart's ligament to the scrotum. The muscles are cut, the peritoneum reached, and the glands removed retroperitoneally. It follows, then, that the twelfth dorsal and the first lumbar nerves are cut, and yet, in one case that Chevassu describes, he definitely says that a year after the operation not the slightest trace of a hernia could be found. In direct contradiction to this, is the case whose photograph is given in Fig. 1. This young man was operated upon in April, 1910, for a stone in the left kidney, and was first seen by the author in March, 1911. At that time, he presented an oval swelling, on coughing or straining, immediately outside of the outer border of the left rectus, about the size of a large orange. A definite margin could be made out, but it felt differently than an ordinary post-operative hernia, so that it was immediately apparent that the deficiency was in the muscular tissue, and that the aponeurosis of the external oblique was still intact.

FIG. 1.



Hernia of anterior abdominal wall following section of last dorsal and first lumbar nerves during operation for renal calculus.

FIG. 2.



Same hernia.

FIG. 3.



Same case, showing scar of previous operation on kidney.

Another illustration of this class of "hernia from paralysis," is that fairly often seen, in which a right inguinal hernia appears a short time after an operation for appendicitis through a McBurney incision. These occur more often in pus cases where the wound has been drained. The logical reason for the existence of this kind of hernia, of course, is that, in separating the fibres of the internal oblique and transversalis muscles, the last dorsal and first lumbar nerves were pressed upon and reached, so that they lay at the edge of the wound. It is quite conceivable that these nerves could be killed by the pressure of a fairly stiff drainage tube, or that the pus in the wound started up an inflammatory process in the nerve substance which led to their subsequent atrophy. Granted this, the lower part of the internal oblique and transversalis muscles would be partially paralyzed. Paralyzed muscles atrophy to a varying extent, but if these atrophied at all, there necessarily would be a certain laxity at the internal abdominal ring, which would probably be enough to allow the passage of an inguinal hernia.

Of recent years, especially since the use of a local anæsthetic, the importance of preserving the iliohypogastric branch of the first lumbar nerve has been realized, so that now almost all surgeons are careful not to wound it or include it in the deep sutures, in order that there may be no paralysis of that portion of the internal oblique which it supplies.

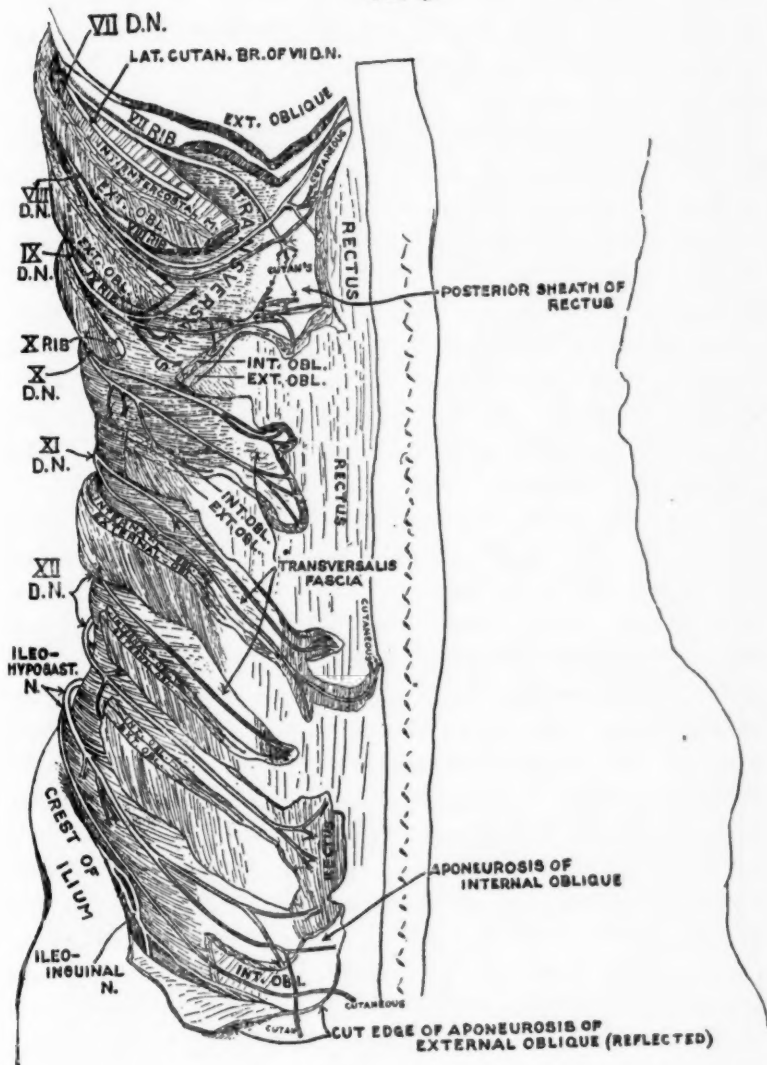
On account of the importance of this subject, the following brief description of the abdominal nerves is given, together with drawings and photographs of some of the dissections which were made by the author in the dissecting room of the Cornell University Medical School. For the privilege of making these and also for his many useful suggestions, the author desires to express his gratitude to Dr. Irving S. Haynes, Professor of Anatomy at the above school.

The nerves under consideration are the anterior divisions of the lower seven dorsal and the first lumbar. The upper dorsal and the lower lumbar are of no interest to us at this

time. The seventh, eighth, ninth, tenth, and eleventh dorsal nerves emerge from below the corresponding vertebra and rib, and lie in the subcostal groove of the corresponding rib below the intercostal artery and vein. At the side of the chest the upper nerves pierce the internal intercostal and lie on the pleura. At the anterior end of the intercostal spaces these nerves pierce the attachment of the diaphragm and the transversalis muscle to the costal cartilages, behind which they pass and run in the abdominal wall between the transversalis and internal oblique muscles. They then pierce the sheath of the rectus, and reach its posterior aspect. They pierce the muscle again, reaching its anterior aspect, and finally become cutaneous over it. Each nerve sends off muscular branches to the muscles which it traverses in its course. After leaving the intercostal spaces, each nerve takes a slightly different course. The seventh, eighth, and ninth nerves turn almost at right angles after leaving the costal arch, the seventh running downward, the eighth and ninth upward in the rectus, and the tenth and eleventh running downward and inward in the same muscle. During their course each nerve gives off motor branches to the intercostals, transversalis, obliqui, and rectus muscles. Besides these, they also give off cutaneous branches, with which we are not especially interested here. Suffice it to say that each nerve gives off a lateral set (*nervus cutaneus lateralis*) which supplies the skin of the loin, and an anterior set which pierces the external intercostals, and, reaching the skin, supplies it from the ensiform to below the umbilicus.

The twelfth dorsal nerve is peculiar in its course and of even more importance, surgically, than the other dorsal nerves, for it can easily be understood in what danger this one is from an ordinary McBurney incision. It leaves below the last dorsal vertebra and last rib, at first behind the psoas muscle and then lies in front of the quadratus lumborum. It pierces the transversalis, and runs between it and the internal oblique in a downward and inward direction to the edge of the rectus, which it pierces, becoming cutaneous over

FIG. 4.



it. It gives off muscular branches to the transversalis, obliqui, recti and pyramidalis muscles. A large lateral, cutaneous branch, commonly known as the iliac, is given off at the side of the abdominal wall, runs downward, becomes superficial over the crest of the ilium about three inches behind the

anterior superior spine, and supplies the skin of the buttock. Beside these branches it also gives off a communicating branch to the eleventh dorsal and one to the first lumbar or its iliohypogastric division.

The first lumbar nerve emerges from below the first lumbar vertebra, and after running a very short distance divides. Its upper division is continued outward in front of the quadratus lumborum, and then pierces the transversalis, as do the dorsal nerves. The lower division helps in the formation of the lumbar plexus, more especially the genitocrural nerve, by joining with the upper division of the second lumbar. The upper division of the first lumbar courses between the transversalis and internal oblique, and divides into two branches, the iliohypogastric and the ilio-inguinal. The former runs about one inch above the crest of the ilium, there giving off its iliac branch, which lies in front of the iliac branch of the twelfth dorsal and about two inches behind the anterior superior spine. The main branch of the iliohypogastric, which is often double, continues downward and inward, roughly parallel to the twelfth dorsal, pierces the internal oblique, and lies about half an inch above the inguinal canal, just under the aponeurosis of the external oblique. It is this nerve that is so often seen in doing the Bassini operation for inguinal hernia, and is not altogether sensory, contrary to the general opinion, as in its course it gives off muscular branches to the transversalis and internal and external oblique muscles. The ilio-inguinal nerve emerges from underneath the internal oblique and transversalis about one inch in front of the anterior superior spine, courses downward and inward just above Poupart's ligament, and behind the aponeurosis of the external oblique, finally coming out through the external abdominal ring with the cord, and ends by becoming cutaneous over the pubes. This nerve gives off several muscular branches in its course. It is the inclusion of this nerve in the deep sutures of a Bassini operation that gives rise to the pain in the wound that we sometimes see after operation.

FIG. 5.



Lateral view of nerves of abdominal wall.

FIG. 6.

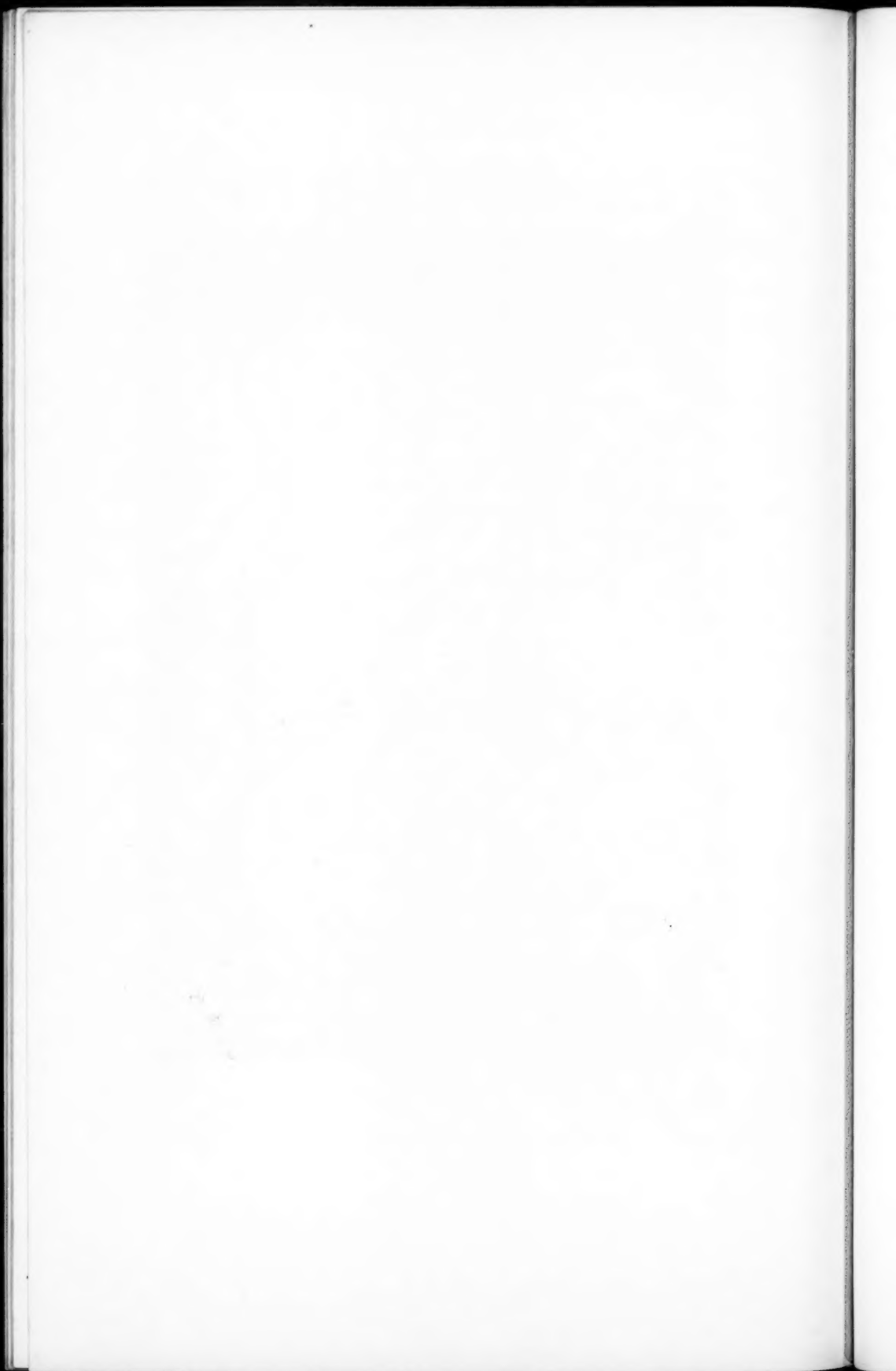


Anterior view showing nerves of entire abdomen.

FIG. 7.



View from behind, showing emergence of abdominal nerves.



The knowledge of the anatomy of these nerves is of greatest importance to the surgeon in placing an abdominal incision. For instance, a high McBurney incision would reach the twelfth dorsal in some part of its course, while a very low one might reach the iliohypogastric. In a Kammerer incision for an appendix, the eleventh and twelfth dorsal and the iliohypogastric nerves are probably very often injured, this being all the more probable because of the fact that here these nerves lie on the posterior sheath of the rectus, and although the muscular fibres are separated, the sheath is generally cut with a knife. As already illustrated by Fig. 1, the twelfth dorsal and first lumbar nerves are in great danger from the usual incisions made in operations on the kidney.

The question may be asked, why do we not see more herniæ from paralysis, inasmuch as there are so many laparotomies done now? The answer to this is, that the communications between the nerves are fairly numerous, and after section of one, its duties are probably taken up by the nerve that communicates with it. Still we know that this does not always occur, and therefore it is the duty of every surgeon, in making an incision through the abdomen, to exert the utmost precaution to avoid injuring any nerve that he may meet.

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AN APPARATUS DESIGNED TO FACILITATE PELVIC SURGERY BY APPROXIMATING THE ABDOMINAL WOUND TO THE DEPTH OF THE PELVIS.

By **WALTER H. TAYLOR, M.D.,**
OF PORT ARTHUR, ONT.

SATISFACTORY retraction of the abdominal wound during hysterectomies or other operative procedures in the deep pelves of fat subjects is exceedingly difficult, sometimes impossible of attainment. On several occasions I have felt the necessity so keenly of some new light upon this problem, that I have dreamed of its solution, and the object of this communication is to call attention to a device I have employed for the purpose of obviating some of the difficulties I have experienced when operating in the pelvis through thick abdominal walls. Dr. Howard A. Kelly, in the March, 1911, number of the *ANNALS OF SURGERY*, advocates lipectomy or the excision of large oval wedges of skin and fat in these cases, not for the relief of the obesity as recommended by him in a former paper, but simply and solely for getting rid of a part of the thickness of the abdominal wall and making the field of operation more accessible. The device described below could be used in conjunction with lipectomy in certain cases of unusual difficulty. In addition to firm uniform retraction of the wound, the writer claims for this apparatus the following advantages: It approximates to some extent the wound itself to the depth of the pelvis. It disposes the plane of the abdominal opening to lie at right angles to a line from the pelvis. It packs out of sight and of harm's way large masses of adipose tissue, thus producing in a fat abdomen many of the ideal characteristics of a thin one. And lastly, it provides absolute protection to the wound itself during the operation, leaving the surgeon, when all is done, to the ecstatic contemplation of a wound of virgin purity, notwithstanding the presence of infection in the pelvis.

The present form of the instrument consists of the following parts: (1) A large oblong steel ring. This is to be laid

on the patient over the laparotomy sheet before the operation begins. It extends from the ensiform cartilage to the pubes or a little below it, and from flank to flank, being depressed at the flanks toward the table and arched above and below, over the thorax and the pubes. A vertical steel post projects from the centre of its pubic portion. (2) A smaller steel circle, about five inches in diameter, made up of two perfect semicircles, which are brought into apposition within the abdomen to form the circle. The semicircles are inserted one piece at a time, much like the blades of midwifery forceps, by grasping the handles, the end of each semicircle nearest the pubes being welded to a shank or handle. When the circle is completed and in position within the abdomen, these two shanks lie together as one. From the junction point of the inner circle this duplicate handle passes directly upward, through the incision at its pubic angle, and emerging from this angle it then runs outward across the skin of the pubic region, the pubic angle of the wound being engaged in the concavity thus formed. These shanks, of which the duplicate handle is composed, are made to interlock upon the surface and simultaneously the circle is completed within the abdomen by the approximation of the free ends of the two semicircles. The shanks being locked, their free ends are applied to the upright steel post on the pubic portion of the outer ring. By means of a set screw on the free end of one of the shanks both shanks are screwed rigidly together and rigidly connected with the steel post on the outer ring as high or as low as is required (Fig. 1). The third component consists of two broad wings of some strong cloth fabric (Fig. 2). It is by means of these that the actual retraction of the wound margin is effected. The same object might be attained, as the same principle would be involved, by a series of tapes attached at regular intervals to points on the circumference of the inner ring, drawn firmly out of the wound in all directions, and attached to corresponding points upon the outer ring. The two broad wings of cloth, however, are much more easily adjusted and at the same time afford better protection to the wound. Each semicircle is sheathed, as in the figure, by the inner margin of one of these cloth wings before its introduction into the abdominal cavity. When the circle is completed within the abdomen it appears entirely clothed, and from all points of its circumference the fabric passes inward to the inner aspect of the wound, passes through the wound, then flares outward across the skin, to be attached to the outer ring. These

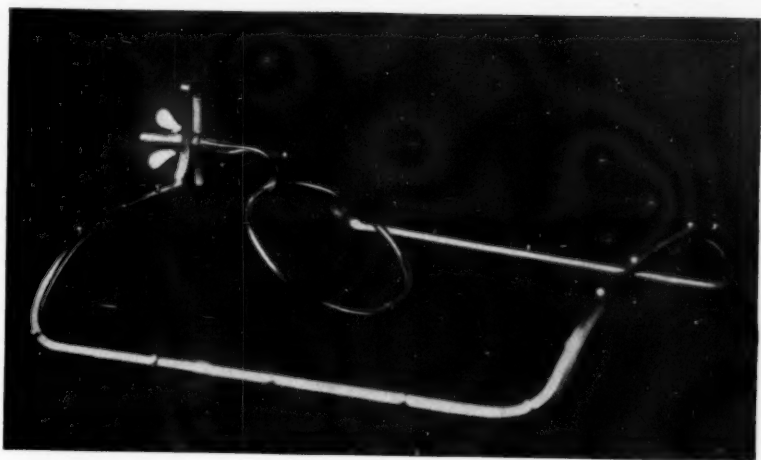
wings overlap each other at their edges, and are reinforced radially by tapes along the lines of traction. They have series of small button-holes extending outward on the tapes which are slipped over rounded steel knobs on the outer ring. A certain amount of radiate reduplication will occur, but the folds lie flat and hard against the wound and skin (Fig. 3). The inner ring lies entirely out of the way beyond the margin of the wound, except where the shanks emerge.

Note the angle at which the inner ring is set (Fig. 1). The effect of this is to keep the pubic region hooded and to cause depression of the remaining area around the wound, thus bringing the wound closer to the depth of the pelvis and disposing its plane to the most accessible angle. It will be seen also why the fat should be flattened out and rolled towards the outskirts. The combined effect of the above considerations will be found very gratifying, as I can testify, when seen in operation. Protection of the wound is a collateral advantage of much importance in these very cases, the bulky and easily devitalized adipose being shielded, not only from bacterial infection but from the reiterated traumatism to which, during the course of long and difficult operations, this tissue is frequently exposed. It is to be observed that the extent of the division of the fat should be in proportion to its thickness, in order that it may be readily displaced. Cleaning the upper surface of the aponeurosis for an inch or so outward on each side tends to loosen the fat from its moorings and thus to facilitate its displacement. Hæmostasis of the incision is provided for during the operation at least, by the pressure exerted in maintaining traction.

The adjustment of this apparatus is not so simple as that of the ordinary self-retaining retractor, but it can be quite readily and quickly accomplished. With the patient in the Trendelenburg position and the sponges placed, introduce one piece with its cloth wing trailing from the wound. Let the lower end of the semicircle rest against the sponges near the posterior abdominal wall and the concavity of its shank engage the pubic angle of the incision. Insert the other piece and lock the shanks, a finger in the abdomen will certify that no bowel is being included. Apply the free end of the shanks to the upright steel post and turn the set screw. The operator and his assistant then spread out the wings and fasten them to the outer ring, drawing gently from opposite sides.

Another feature to be considered as an advantage is the fact

FIG. 1.



Inner and outer rings. Inner ring composed of two semicircles rigidly connected with steel post on outer ring by means of set screw. The cloth wings are not shown.

FIG. 2.



Semicircles with cloth wings attached ready to be inserted into the abdominal cavity.

FIG. 3.



Apparatus complete. Cloth wings making traction from the inner to the outer ring, thus spreading and depressing margin of wound.

that the depressed portion of the inner ring and the fabric which extends from it to the umbilical angle of the incision act as a buttress for the sponges employed in packing away the bowels, thus preventing their encroachment on the operative field. Greater security in infective cases would probably be assured from the fact that the sponges are divided naturally into two sets—the permanent sponges held firmly in place external to the depressed circumference, and the sponges packed lightly in front of these within the lower arc, which can be renewed at will. The Trendelenburg position may be dispensed with if thought advisable.

The model shown in the figure is the second one that I have had made for me. The first one, though made by a blacksmith and very crude, answered the purpose surprisingly well. A modification has lately occurred to me, however, of which I have as yet no model, which will I believe appreciably enhance the usefulness of this instrument. Instead of the inner ring being a perfect circle all the diameters of which are in the same plane, my present suggestion is to have its plane warped so as to produce an anteroposterior concavity looking toward the operator, its convexity toward the pelvis, the angle at which the ring depends from the pubes remaining as in the figure, but sagging now towards the pelvis in happy imitation of the scaphoid lines so characteristic of the emaciated abdomen, to the classic delineaments of which it is our purpose to have obesity conform! The fat which is to be displaced toward the flanks and packed into the right and left inguinal regions can be more readily manœuvred across these concave steel rami descending from the pubes.

In conclusion I am confident that this instrument needs but to be employed once in a difficult case of pelvic surgery for its value to be appreciated. To those who, like myself, are prone to feel that they at least are ill able to afford to neglect to avail themselves of an added facility, I beg to commend this device. It has proved invaluable to me, and I cannot but believe that it will prove serviceable to others, more particularly in those cases of pelvic surgery in which very thick abdominal walls are the chief cause of difficulty.

NOTE ON PENETRATING WOUNDS OF THE ABDOMEN. *

REPORT OF CASES TREATED AT THE MACON, GA., HOSPITAL.

BY J. R. BROMWELL BRANCH, M.D.,

OF MACON, GEORGIA,

Gynecologist to the Macon Hospital.

FROM 1905 to 1910 inclusive I was able to collect from the Macon Hospital records 50 cases of penetrating wounds of the abdomen. There was a mortality of 52 per cent. Two cases were not operated on and died; two were incised wounds, both recovered; the remainder were pistol shot wounds. During the past year we had 15 cases which came under my personal observation, and it is these which I wish to report in detail.

	Recovered.	Died.	Total.
1905.....	3	1 (no operation)	4
1906.....	3	5 (1 not operated on)	8
1907.....	5	5	10
1908.....	3 (2 incised)	3	6
1909.....	3	4	6
1910.....	7	8	15
	24—48 per cent.	26—52 per cent.	50

These cases were operated upon by six different surgeons with considerable difference in technic. From experience as well as reference to the literature, we have reached the following conclusions:

1. In all penetrating wounds of the abdomen seen within twelve hours of the injury, operation should be done as promptly as is consistent with good technic and careful, skilful work.
2. The incision should be so made and large enough to

* Read before the Medical Association of Georgia, April 20, 1911.

insure a thorough survey of the abdominal viscera without unduly exposing them.

RECOVERIES.

Cases in 1910.

Case No.	Age.	Race and sex.	Time between injury and operation.	Number of perforations.	Remarks.
1.....	4	B.M.	12 hrs.	4	Two perforations in large bowel, 1 in stomach, 1 in liver.
2.....	17	B.F.	2 hrs.	0	Peritoneum entered tangentially, no viscera injured.
3.....	25	B.M.	6 hrs.	0	Peritoneum entered tangentially, no viscera injured.
4.....	21	B.M.	1 hr.	12	12 perforations in small bowel, two in large.
5.....	18	B.M.	1 hr. 30 min.	14	
6.....	22	W.M.	1 hr. 30 min.	6	Small clean-cut perforation in small bowel with steel coated ball.
7.....	35	B.M.	3 hrs.	3	Two perforations in large bowel, one in liver.
Total			27	39	
Average			3 hrs. 50 min.	5.57	

3. Extensive evisceration is unnecessary and unjustifiable, greatly increasing the mortality.

4. Unless the peritoneum is extensively soiled, intestinal contents should be wiped away with salt gauze sponges, irrigation does more harm than good.

5. If the closure of the perforation or destruction of blood supply threaten seriously the usefulness of a portion of bowel, resection should be done.

6. If the peritoneal cavity be generally or extensively soiled, or if there be any considerable oozing, drainage is safer; otherwise the incision may be closed.

7. Post-operative treatment is very important. If there be no lesions in the large bowel salt solution and coffee, of each 150 c.c., should be given per rectum every four hours. If the large gut be injured, the continuous drop method of Murphy is preferable.

Fowler's position should be maintained, pain controlled and peristalsis diminished with moderate doses of morphia. In

DEATHS.

Case No.	Age.	Race and sex.	Time between injury and operations.	Number of perforations.	Remarks.
1.....	55	B.M.	12 hrs.	5	Died in 56 hours. of peritonitis.
2.....	35	B.M.	6 hrs.	15	Came in almost moribund; died on table; two perforations in bladder.
3.....	15	B.M.	3 hrs.	15	Came in almost moribund, died on table.
4.....	37	B.M.	7 hrs.	2	Patient improved steadily after operation; died suddenly two and one half days later.
5.....	39	W.M.	12 hrs.	4	Two perforations in large bowel, two in small; died in 18 hours of shock.
6.....	39	B.M.	12 hrs.	15	Died 18 hours later, never rallying from operation.
7.....	19	B.M.	3 hrs.	14	Died in 4 hours of shock.
8.....	25	B.M.	3 hrs.	14	Died in 27 hours of shock.
Total			58	84	
Average			7 hrs. 15 min.	10.5	

	Recovered.	Died.
Cases operated upon within 2 hours.....	4 (100%)	0
Cases operated upon within 2 to 7 hours.....	2 (28.5%)	5
Cases operated upon within 7 to 12 hours.....	1 (25%)	3
	7	8

injuries to the stomach or small bowel, nothing but small amounts of water should be given by mouth during the first 48 hours. Small quantities of liquids may then be given, care being exercised to avoid distension. This symptom is often troublesome and is best relieved by the rectal tube.

CONGENITAL HYPERTROPHIC STENOSIS OF THE PYLORUS.*

BY RUSSELL COOMBE, F.R.C.S. (Eng.),
OF LONDON, ENGLAND.

With Notes by W. GORDON, M.D. (Camb.), F.R.C.P. (Lond.), and
J. SHIRLEY STEELE-PERKINS, M.D. (Camb.).

PRELIMINARY NOTE BY DR. W. GORDON.

ON December 14 last I was asked by Dr. Cooper of Lyme Regis to see a baby, six weeks old, which was vomiting almost all its food. The vomiting had begun soon after birth, had been slight at first, but had gradually got worse until almost everything was returned, a feed of more than an ounce being almost certain to be vomited. The vomiting was sudden and moderately forcible. There was constipation; small, sometimes greenish, motions being occasionally passed. At birth the weight had been 10 pounds, now it was only about 8 pounds.

I found the child very thin, but hungry, alert, and looking quite unlike one suffering from severe gastritis. A small feed had just been given. On uncovering the abdomen a slight tumor was visible between the left ribs and the umbilicus and after a sharp flick on the skin in that region, this tumor became more marked, and waves of peristalsis could be seen passing over it from left to right. Careful palpation, however, failed to discover any pyloric thickening, although the abdomen was flaccid and the child amenable, so that examination was unusually easy.

We diagnosed hypertrophic pyloric stenosis and, as careful dieting had failed to prevent rapid loss of weight and strength, we decided only to postpone operation for a few days, during which we tried peptonized milk in very small feeds and gastric lavage with normal saline solution. Meanwhile to minimize the effects of further vomiting, we ordered

* Read before the Southwestern Branch of the British Medical Association, January 24, 1911.

nutrient enemata of peptonized milk and egg. Bismuth and soda with small doses of carbolic acid and cocaine were given as medicine.

By December 19 vomiting was not arrested and the weight had dropped to 7 pounds 7 ounces. It did not, therefore, seem justifiable to further postpone surgical interference, and we asked Mr. Russell Coombe to operate.

NOTES BY MR. RUSSELL COOMBE¹.

As in most comparatively recently distinguished morbid conditions, the number of cases reported shows a steady increase. That the disease is still frequently overlooked is suggested by the fact that six out of 20 cases seen by Dr. Hutchinson in private were the children of medical men.

Besides the present case only one other case has come prominently to my notice. I refer to Messrs. Harpers' case²—and it was the child of a medical man.

In 1903 Cautley and Dent were able to collect 19 cases operated on; in 1906 Fisk compiled a list of 71 cases so treated; the mortality being 46.47 per cent., with no improvement in the later part of the series.

Fisk's tables show that the operations that have been performed are as follows:

	Cases.	Mortality.
Pylorectomy	1	100 per cent.
Gastro-enterostomy	42	42.56 per cent.
	(1 case with Murphy's button died.)	
Divulsion	18 ³	50 per cent.
Pyloroplasty	11 ⁴	27.28 per cent.

¹ For the bibliography of this condition the reader is referred to: (1) Dr. Cautley and Mr. Dent's paper in the *Medico-Chirurgical Transactions* for 1903 (Volume 86). (2) Dr. Fisk's paper in the *ANNALS OF SURGERY* for July, 1906. (3) The discussion on the subject in the Section of Pædiatrics at the Toronto Meeting of the British Medical Association in 1906, *Brit. Med. Journ.*, 1906, p. 943, Oct. 13. (4) Dr. Robert Hutchinson's Schorstein Lecture in October, 1910, *Brit. Med. Journ.*, 1910, p. 1021, Oct. 8.

² The *Lancet*, August 19, 1905, p. 503.

³ One case required gastro-enterostomy later; this would raise the failures to 55.5 per cent.

⁴ Two of these cases died later; one after 10 weeks from zymotic disease, the other after 5 weeks, cause not stated.

Cautley and Dent state one of the objects of their paper to be to show "that the affection may be successfully treated by pyloroplasty," and Fisk's statistics certainly justify their advocacy of this operation. They quote Monnier, Robson, Moynihan, Abel, Weill, and Péhu, as putting pyloroplasty out of the question on account of either the induration or thickness of the pyloric wall.

In their paper they also point out certain objections to gastro-enterostomy, viz.:

1. The increased exposure of the abdominal contents which it necessitates. More recent experience in abdominal surgery only adds to the force of this argument.

2. The increased time required; this they emphasize by drawing attention to the smallness of the parts concerned and the fact that the delicate manipulations required by the operation, if efficiently performed, must take considerable time. I was particularly struck in my case by the tiny size of the duodenum; it did not exceed three-eighths inch in diameter (about half the size figured in the full size photograph in the *Medico-Chirurgical Transactions* of one of Mr. Dent's cases), and if the jejunum was on the same scale a gastro-enterostomy would have been a very difficult, if not an impossible, anastomosis to make secure.

3. There is increased risk of protrusion of the intestine—this must obviously be the case, and to avoid risk of it a deeper anæsthesia (with its accompanying additional risks) must be procured.

4. The incision has to be prolonged further down. Cautley and Dent and Stiles have both drawn attention to the thinness of the abdominal walls and the separation of the recti in these wasted infants; in my case there seemed nothing but a thinned out layer of fascia, representing the linea alba, between the skin and the peritoneum; by no means an ideal abdominal wound to suture and certainly the less of it the better.

As an old house surgeon of Mr. Clinton Dent's with the confirmation of his opinion given by Fisk's statistics, I had no

hesitation in deciding on pyloroplasty when called on to operate on this case of congenital hypertrophic stenosis of the pylorus.

My incision was a central one, limited to about one and a half inches, its upper end being only a little below the ensiform cartilage. The pylorus was immediately revealed and resembled in size and shape the smallest size Murphy's button. I saw nothing of any abdominal contents beyond the pylorus and the adjacent parts of the stomach and duodenum; the former being greatly dilated and the latter, as I have before stated, of extremely small calibre.

A length of warm gauze from a roll was immediately wrapped round the parts concerned, and had there been any straining, this would, I am sure, have retained the intestines better than flat swabs.

The first incision into the thickened pylorus as it happens did not divide the mucous membrane and this immediately bulged up; there was plenty of it, as has been pointed out by Cautley and Dent. It was then divided, the length of the incision being about one and a half inches. The ends of this longitudinal incision were now brought together to make the central point of union; and all coats were sewn together transversely.

My only difficulty now revealed itself; it is that which has been pointed out, and I, personally, found it a very real one. It was to get anything like a safe union of peritoneum at the ends of the now transverse incision. The hard thickened pylorus could not be so manipulated as to give anything like what I wanted to make the closure safe, without an amount of turning in, which I was afraid would defeat the object of my operation. Fortunately some handy omentum was available, and two or three sutures quickly fixed this over the line of anastomosis.

The gauze was removed and the parts at once returned.

The abdominal wall was, as already stated, so thinned out that only interrupted silkworm sutures, fairly close together, could be used; they are of course a very quick form of suture, as there is no delay in getting the peritoneal edges; a continuous fine catgut skin suture completed the operation.

From start to finish the operation took under half an hour; some five minutes having been lost in attempt to close in the thick ends of the pyloric ring.

At the end of the operation the child was, notwithstanding all the precautions which had been taken, in a much collapsed condition; still it was on the whole better than one might have anticipated. It was at once put on rectal enemata, consisting of one drachm of peptonized milk, with three drachms of saline every half hour, equalling six ounces of peptonized milk and eighteen ounces of saline in 24 hours. The bowels acted twice on the day succeeding the operation and flatus was first noticed a day later. There was no post-operative vomiting. Nutrient enemata (which were well retained) were continued for 72 hours. Then two drachm feedings of peptonized milk were begun, and being found to be well borne, were repeated every two hours during that day; giving three ounces in the 24 hours in addition to the nutrient enemata.

At 96 hours the feeding was increased to three drachms every two hours, equalling four and a half ounces in 24 hours.

On the fifth day a nutrient was, for the first time, returned, but the feeds were increased to one and a half ounces every two hours, giving eighteen ounces in 24 hours. From this time progress was uninterrupted.

Weights were as follows: One week after operation, eight pounds one ounce; two weeks after operation, eight pounds fourteen ounces; three weeks after operation, nine pounds ten ounces, a gain of two pounds three ounces.

From the surgical point of view I desire to draw attention to certain points connected with the operation.

First as to choice: Pylorectomy or gastro-enterostomy by Murphy's button was of course out of the question; the former is by universal consent put out of court as too severe, and the latter was equally impossible since no Murphy's button that I possess or have seen is nearly small enough.

Divulsion seems a leap in the dark and does not appear to me to be consonant with modern surgical procedures and knowledge.

There remained then for serious consideration: Gastro-enterostomy, pyloroplasty, and Finney's operation.

I decided on pyloroplasty, and I think wisely; had I decided on gastro-enterostomy I believe, judging from the size of the

duodenum, that I should have found the jejunum so small as to necessitate an abandonment of my intention.

Finney's operation was rather tempting, but I thought on full consideration the amount of stitching it required would take longer, and time was everything.

There are certain changes in procedure I shall adopt if I ever have to operate for this condition again. I should make a transverse incision in the peritoneum over the pylorus, and strip it back on each side in a longitudinal direction. I should then divide the thickened pyloric ring in the longitudinal direction down to, *but not including*, the mucous membrane. There is, as Cautley and Dent have pointed out—indeed almost complained—plenty of mucous membrane; it is in no way implicated in the narrowing. I should next separate the thickened pylorus to its upper and lower poles from the mucous membrane and cut it away. It would then be quite easy to invert and bring together the transverse incision in the peritoneum without any tension whatever.

I have carefully looked to see if this procedure has been previously suggested, and the only hint of it I can find is one line in Dr. Cautley's opening address at Toronto where he says: "If the muscle is very thick and hard, a portion on each side can be snipped out before suturing." I trust that some surgeon with greater opportunities of seeing these cases than can fall to my lot will give my suggestion a trial.

NOTE by DR. SHIRLEY PERKINS on the anæsthetic used and the means employed to combat shock.

To give an anæsthetic to an infant, even in good health, at seven weeks, for an abdominal operation, is a very serious matter, and the outlook cannot in any way be considered a hopeful one, but when there is combined with this tender age, such a degree of emaciation and general collapse, induced by continuous vomiting, as was presented in the case under discussion, the outlook seemed absolutely hopeless.

Before administering an anæsthetic in a case of this nature, it is particularly necessary to save the child's vital forces by every means in our power, so that it can contend with the severe

shock following such an operation. Every little helps, and the preliminaries to anæsthesia are most essential.

In the present case the precautions taken were as follows: (1) The room was kept very warm. (2) The stomach was washed out with normal saline until the returning fluid was free from mucus, etc. (3) The child was enveloped in a dress of gamgee tissue carefully warmed before being put on—only sufficient of the abdomen being exposed for the incision. (4) Small hot bottles were placed at the sides and feet. (5) During the operation normal saline with brandy was slowly injected per rectum by means of Mr. Arbuthnot's transfusion bag and apparatus.

Now, as regards the choice of an anæsthetic, it seemed to me to be highly dangerous in a child so weak and ill to give chloroform to the degree that was necessary for an abdominal operation, and to obliterate any chance of straining with prolapse of the bowel, and thus to interfere with the rapidity of the surgeon's work. I therefore decided to begin with just a few drops of chloroform on a Skinner's mask, and passed rapidly on to open ether given on the same mask. This I found the child took well, and I was able to maintain a good enough anæsthesia for Mr. Russell Coombe to finish his operation within about half an hour of commencing. The ether seemed to stimulate the child, and it went through the operation very much better than anyone had dared to hope.

NOTE.—Extract from a letter of March 24, 1911, from the child's mother:

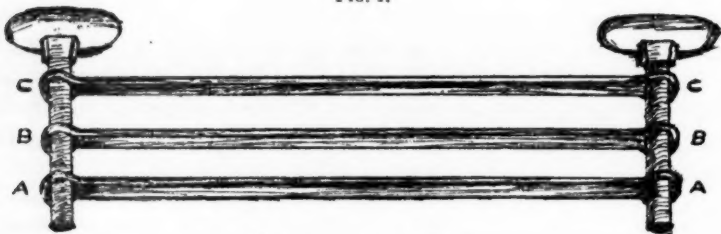
"He now weighs 15 lbs. 13 oz. and gains about 2½ oz. every day—last week he put on 1 lb. 3 oz. . . . He never seems to suffer in the slightest from indigestion, but has become the most vigorous of babies."

A SIMPLIFIED GASTRO-ENTEROSTOMY CLAMP.

BY WILLARD BARTLETT, M.D.,
OF SAINT LOUIS, MISSOURI.

THE Doyen clamp and its modifications have rendered gastro-enterostomy safe and easy by enabling us to prevent the escape of blood and visceral contents. There are, however, certain mechanical drawbacks to any instrument constructed upon that plan. It is not possible for its blades to exert uniform pressure at every point. Tissue which happens to be very near the joint is exposed to a crushing force, while that near the tips may be compressed to the point desired, and still the blades be widely apart at the middle. Furthermore, pressure cannot be graduated to any degree desired, since one notch near

FIG. 1.



Gastro-enterostomy clamp.

the handle makes a vast difference in the crushing force exerted on tissue, which may already be tightly held between the blades.

As noted in Fig. 1, the contrivance which I propose is made up of three parallel bars, *A A*, *B B*, and *C C*, *A A* being threaded to run on screws on either end, while *B B* and *C C* are free, and the action of the thumb screws is to draw all three bars together.

Rubber tube can be drawn over the three cross-bars by simply removing one of the screws, which is then replaced and the instrument thus made ready for use.

It is my custom to employ it as follows: The cross-bars are set at a distance of one centimetre from each other. Two catch-forceps draw the stomach up through one interspace, while the intestine is similarly engaged in the other. The de-

FIG. 2.



Diagram of rigid steel cross-bar.

sired position of the viscera having been thus secured the bars *AA* and *CC* are pressed against them by the operator's thumb and fingers, until by this direct and accurate means he has secured exactly the pressure which is deemed necessary

FIG. 3.



Cross section of bar (actual size).

and safe, then the whole is locked *in statu quo* by turning the screws until they engage.

I have used the instrument without a third bar between the viscera, but this is not to be recommended, since they tend thus to slip laterally away from one another.

THE PATHOLOGY AND SYMPTOMATOLOGY OF GALL-STONES.

BASED UPON AN EXAMINATION OF OVER 400 CASES OCCURRING AT THE
LONDON HOSPITAL.

(Continued from page 109 of last issue.)

BY ALBERT J. WALTON, M.S. (Lond.), F.R.C.S. (Eng.), M.B.,
L.R.C.P., B.Sc. (Lond.),

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London Hospital.

COMPLICATIONS OF CALCULI IN THE BLADDER.

I. *Acute Cholecystitis.*

This condition is a not uncommon complication of gall-stones, all cases of cholecystitis being generally dependent upon the presence of one or more calculi. Rigby⁹² found in his series of 46 cases of cholecystitis, that gall-stones were present in all but two. In this series of cases of gall-stones there were 78 cases of acute cholecystitis.

The following varieties may be present:

Acute Catarrhal Cholecystitis.—It is probable that this condition is extremely common with gall-stones. As already mentioned there is considerable evidence that the diffuse pain occurring with stones in the gall-bladder is dependent upon a condition of inflammation, and with the acute attacks it is probable that there is an acute catarrh of the gall-bladder. Many cases are seen in which the patient has acute pain over the epigastrium and right hypochondrium with rigidity and tenderness. At the onset pyrexia and vomiting may be present. Within a few days the severity of the symptoms is greatly decreased, so that local tenderness or perhaps a tumor due to the enlarged and dilated bladder may alone persist. As already described, an acute catarrh is probably the first stage in the formation of gall-stones, but symptoms appear to be much more marked when gall-stones are present, that is to say when the acute catarrh supervenes on a chronic cystitis.

Acute Suppurative Cholecystitis.—This may occur as two distinct conditions:

(a) Without obstruction: In this case the condition is simply a further stage of the acute catarrhal cystitis, the inflammation has spread beyond the mucosa to the other constituents of the wall of the gall-bladder. Leucocytes are poured out and pus is thus formed within the cavity of the gall-bladder. There are often hemorrhagic areas beneath the mucosa which is acutely inflamed and commonly ulcerated, especially at those spots at which it is exposed to the pressure of the calculi. The gall-bladder is generally dilated, and its walls thickened and œdematous, often deep red in color, and showing infected vessels. On the outer surface there may be many recent adhesions and deposits of lymph. The bladder itself contains pus or mucopus mixed with bile and in some cases stained with blood. Rarely this condition may occur apart from calculi, as in one of the cases reported by Rigby.⁹²

In this series there were 34 cases of acute suppurative cholecystitis dependent upon gall-stones, in which there was no evidence of obstruction of the cystic duct and neck of the gall-bladder. Six were acutely inflamed without the presence of pus, apparently simply a catarrhal condition, whilst eight showed changes noted as hyperplastic cholecystitis, apparently a chronic inflammatory change with thickening of the walls together with a recent inflammatory change.

Symptoms: Not uncommonly the condition may start as a catarrhal cholecystitis, although in the majority of cases a previous history of gall-stones in the bladder can be obtained. In some cases there is an interval of improvement after the acute catarrhal attack, to be followed by severe symptoms with the formation of pus. Such a case has been recorded at length by Monsarrat.⁷² More commonly there is a sudden onset of severe pain in the epigastrium and right hypochondrium, radiating to the back and shoulders, and accompanied with marked tenderness and rigidity of the abdominal walls, especially on the right side. There is nausea and repeated vomiting with pyrexia and a rapid pulse. Such a condition

may closely simulate a case of acute appendicitis. If untreated, the inflammatory change may be progressive, and ultimately rupture or perforation of the gall-bladder take place; more commonly, however, there is some abatement of the symptoms, this being slow, in contradistinction to the rapid changes which may take place when a stone is impacted. The rigidity and tenderness may sufficiently disappear for the inflamed and enlarged gall-bladder to become palpable.

(b) With obstruction: In this condition, which is rather less frequent than the last, a calculus has become impacted in the cystic duct or neck of the gall-bladder. If the infection be very mild, a hydrops of the gall-bladder will first develop, the fluid gradually being converted into pus so that an empyema is slowly formed. If, however, the infection be acute, very severe inflammatory changes may be set up and give rise to a more rapidly progressive condition than in the last case.

In the milder cases, the gall-bladder may be simply dilated and show a few old or recent adhesions, the walls being perhaps a little thickened. The fluid drawn off may be at first clear and mucoid, the deeper layers only containing pus. In other cases the whole fluid may be purulent, but only slight inflammatory changes are present. Even in such cases the mucosa will often show areas of necrosis and ulceration, these being most marked either at the fundus or at the neck at the site of impaction of the gall-stone.

In the more acute cases the gall-bladder is markedly inflamed, there are adhesions and deposits of lymph, whilst the wall is oedematous and vascular. The fluid contained in the bladder is purulent and may be foul, in some cases being mixed with altered blood and sloughs from the injured wall. The mucosa is irregular, ulcerated, and often hemorrhagic. In some cases areas may slough through and the contents thereby escape into the peritoneal cavity, rapidly giving rise to a diffuse suppurative peritonitis. This gangrenous change usually takes place in the fundus of the gall-bladder, as in a case reported by Monsarrat,⁷² secondary to an impacted

cholesterin calculus, and another figured by Moynihan.⁷⁴ If the perforation be less acute, it may be shut off by adhesions and a localized abscess arise as in cases of chronic ulcerative cholecystitis.

Symptoms: In the milder cases the symptoms will commence with those characteristic of a stone impacted in the cystic duct, and indeed nothing further may be noted. If an infection be also present, the symptoms are severe, usually more so than when cholecystitis occurs without obstruction. There is a sudden onset of severe pain, which may at first be colicky in nature, but later becomes more constant and radiates from the abdomen to the back and shoulders. There is tenderness and rigidity, at first of the whole abdomen, later localized to the right hypochondrium. The respirations are shallow and jerky, of the peritoneal type, and abdominal movements are decreased. With this there is constipation and repeated vomiting, often of bile. While the pain is of the nature of colic the patient may be collapsed, but as this is replaced by the more constant but less severe inflammatory pain, the temperature will rise to 102° or 103° . As Moynihan⁷⁴ has pointed out, the temperature chart often shows a steeple form. This condition if left will generally progress to perforation and then pursue the usual clinical course of a severe diffuse suppurative peritonitis. At times, however, the impacted calculus may be loosened by the inflammatory change and drop back into the bladder, when the acute symptoms usually rapidly subside.

In this series there were 21 cases of acute suppurative cholecystitis secondary to an impacted calculus. Of these eight were of the milder variety and showed little if any evidence of pus previous to operation. In two of them the pus drawn off from the gall-bladder was sterile on culture. The other 13 were of the more acute variety. In addition to these there were two cases where acute ulcers had perforated and led to diffuse peritonitis. These have been considered with gangrenous cholecystitis.

Acute Membranous Cholecystitis.—This is a very rare con-

dition in which a membranous cast is formed by the mucosa of the gall-bladder, the condition being generally dependent upon the presence of gall-stones. The membranous cast being separated from the wall of the gall-bladder may remain *in situ* or be passed down the cystic and common ducts. In the classical case recorded by Fenwick,³⁰ two casts in shape typical of the gall-bladder and stained with bile were passed in the fæces after attacks of biliary colic. This man had previously passed gall-stones. More commonly, however, there will be attacks of colic or pain in the region of the gall-bladder, but the cast will not be passed. It will then be found in the gall-bladder at operation. Rolleston⁹⁶ has recorded such a case, Moynihan⁷⁴ a further one, and Mayo Robson⁶³ two that were cured by cholecystotomy.

There were in this series two such cases, in both of which a complete cast was found at operation. In neither was there a history of any cast having been passed and found; in one only had there been colic, this being apparently due to the calculus.

Acute Phlegmonous or Gangrenous Cholecystitis.—If by this condition is meant only an acute inflammatory change leading to extensive gangrene of the gall-bladder, then it is very uncommon. Thus Courvoisier,²⁰ in the extensive number of cases of gall-stones recorded by him, was only able to find seven cases. If, however, localized conditions of gangrene, such as may occur with ulceration around a calculus, are included, the disease becomes relatively common. This probably accounts for the greater frequency of the condition as described by Mayo Robson, who published 57 cases,⁶⁴ this number lately having been brought up to nearly 100.⁶² In the majority of cases it is dependent upon the presence of calculi. Thus Moynihan⁷⁴ has carefully collected eighteen cases, in sixteen of which calculi were present, but an interesting case has been recorded by Lett⁵⁵ and another by Wendel,¹⁰⁹ where the gangrene was due to axial rotation of the gall-bladder, which in both cases had a free mesentery. Worthington¹¹⁴ has reported another case where gangrene and perforation

occurred without the presence of calculi, the condition apparently being due to an acute infection as in Gütig's³⁹ case. Mention has already been made of cases of acute perforation and gangrene occurring with or after typhoid fever.

In the majority of cases, however, the condition appears to be an acute infection following the presence of gall-stones.

The gall-bladder will be somewhat dilated or collapsed according as to whether rupture has yet taken place. In the earlier stages the walls may be thickened, and on section small areas of pus may be seen, these apparently arising from septic thrombosis of the vessels of the gall-bladder. In later stages the walls are blackened or greenish, with deposits of lymph and pus on the surface, whilst in one area, an irregular opening where the wall has sloughed through is usually present. A diffuse peritonitis is then found.

Among the present cases there were six in which spontaneous perforation occurred; in one there was no sign of any inflammatory change, although gall-stones were present, and the cause of perforation remains very doubtful. In two others perforation had occurred at the site of ulceration of a calculus in cases of acute suppurative cholecystitis, thus leaving three cases only of true gangrene. In addition to these there was one case described as phlegmonous cholecystitis, in which perforation had not taken place. The wall was thickened and on section pus exuded from it. There was neither pus nor calculi within the gall-bladder, but three faceted stones were impacted in the cystic duct. It is probable that in such cases infection of the wall of the duct may take place at the site of impaction and travel along the vessels and lymphatics to the wall of the gall-bladder.

II. *Chronic Cholecystitis.*

This is the commonest complication of gall-stones, and it is probable that whenever they have existed for any length of time chronic inflammatory changes will be found in the bladder. Since the stones themselves are the result of a chronic infection, they will mechanically irritate the bladder

and aggravate or maintain the chronic cystitis, so that a vicious circle is formed. In the cases in this series there were 148 showing different forms of chronic cholecystitis. The following varieties may be recognized:

Chronic Fibrous Cholecystitis.—This is the most common condition, 121 of the cases of this series being affected in this way. The original catarrhal inflammation of the gall-bladder becomes chronic and exaggerated by the presence of the gall-stones. The changes are no longer limited to the mucosa but spread to the muscular and serous coats, the former of these becomes infiltrated with inflammatory cells, and may, in the earlier stages, be thickened from a fluid exudate. The serous coat at the same time becomes roughened, and in the more acute stages may even show deposits of lymph upon its surface. Structures in the neighborhood, more commonly portions of the great omentum, but not uncommonly gastro-hepatic omentum, abdominal wall, stomach, duodenum, or transverse colon, become affected and adhere to the surface of the gall-bladder.

Later the inflammatory exudates become organized so that the wall of the gall-bladder may be greatly thickened, and as fibrosis takes place, shrunken and distorted, whilst the surrounding adhesions become firmer and more fibrous, so that the pylorus or duodenum may be thereby obstructed.

In long existing cases the gall-bladder will nearly always be found thus contracted, the end result of stones in the bladder being, as a rule, not dilatation but the formation of a shrunken, fibrous structure. Thus of the 121 cases, 26 alone showed any dilatation of the bladder, probably because the lower stone or stones caused partial obstruction to the opening of the cystic duct. The ultimate appearance of the gall-bladder will, to a large extent, depend upon the nature of the gall-stones present. If these are multiple, they may be compressed together to form a mosaic, which tightly fills the gall-bladder and is held in place by the contracted walls of the viscus. The mutual pressure of the gall-bladder and calculus has already been mentioned for the case of only one large

gall-stone, the result being that the irregularities of the surface of the calculus fit into corresponding depressions of the gall-bladder. If, however, the calculus partially obstruct the cystic duct, the gall-bladder may be somewhat dilated.

In many cases the fibrosis may extend from the gall-bladder to the neighboring portion of the liver and thus lead to difficulty in removal.

If only two calculi of considerable size are present, the bladder may contract around them and a typical hour-glass condition result, the two cavities being separated by a narrow canal. A similar condition may arise with only one stone. If this be situated in the fundus, this area of the bladder may show marked inflammatory changes and may contract around the stone, while the lower portion of the bladder will be relatively free from such changes and will maintain the normal size of its lumen, so that it will communicate with the cavity above containing the stone by a relatively narrow lumen. The method of formation of such a condition is well shown by the fact that the wall around the calculus and the isthmus shows much inflammatory thickening, whilst that around the lower cavity is of normal or only slightly increased thickness.

The condition seems to be uncommon, for among these cases an hour-glass form of the gall-bladder from inflammatory changes was only noted in 2 cases.

If there be only one or several small stones, the contraction of the gall-bladder may be extremely marked, so that a small, hard, shrunken area is alone left. In many such cases the shrinkage may be so marked that it becomes difficult or almost impossible at operation to discover the gall-bladder, which at the same time is usually surrounded by dense adhesions.

In some cases calcareous changes may take place in the wall of the thickened gall-bladder. In cases which have existed for many years it is not at all uncommon to find small calcareous areas in the greatly thickened fibrous wall. In some rare cases, however, the condition becomes much more marked, and the whole thickness of the wall becomes a stony

mass. In such cases as in one in this series, the walls may be $\frac{1}{2}$ -1 inch thick, the calcareous matter being peculiarly laminated and having a very close resemblance to bone. The cavity of the gall-bladder may be shrunk or distorted from the irregular shape of the walls. It is generally lined by an altered and inflamed mucosa, but this structure can, as a rule, be definitely recognized, and is unaffected by the calcareous change. Such gall-bladders show dense and firm adhesions to the surrounding structures, but provided these can be separated there will not, as a rule, be difficulty in removing the bladder, for the calcareous changes end at the commencement of the cystic duct.

Chronic Ulcerative Cholecystitis.—The presence of ulceration occurring in the acute conditions has already been described, but it may also occur in the more chronic inflammations either in the bladder or ducts. If a gall-bladder be contracted around a stone or stones, the mucosa in contact with them often shows ulceration. This is most common either at the extreme fundus of the gall-bladder or in the dilatation just proximal to the origin of the cystic duct, Hartmann's pouch. In some such cases the mucosa may, in this way, be completely ulcerated through and the calculi thus come to lie in submucous pouches or diverticula, the condition then very closely resembling an hour-glass or other deformed and loculated gall-bladder. In only one of these cases, however, was a distinct loculus noted.

More commonly, as the gall-bladder contracts the ulceration tends to progress, and inflammatory changes in the overlying serous coat become more marked, so that, if not present before, adhesions to surrounding structures are formed. In some cases these adhesions are attached to the liver or abdominal wall, so that when the gall-stone has completely ulcerated through the walls of the bladder it comes to lie in a secondary cavity outside. In the former case an abscess within the liver substance containing the gall-stone may be formed, or in the latter the cavity may gradually extend outwards through the abdominal wall until the skin is per-

forated, usually somewhere in the neighborhood of the umbilicus, and the calculus is spontaneously discharged. If the diverticulum be at the neck of the bladder it may cause pressure upon the common duct, portal vein, or duodenum. In four cases of this series it was noted that such a pouch caused pressure upon the common duct. In Courvoisier's²⁰ analysis of 169 cases of external fistulæ, it is shown that such external fistulæ may open in many situations often remote from the gall-bladder. Porges⁸⁵ has recorded one that opened on the thigh. Of Naunyn's⁷⁸ 384 cases, 184 opened on to the abdominal wall. In seven of the cases in this series it was noted that an abscess was present around the gall-bladder, but in only one apparently was a sinus spontaneously formed.

In other cases adhesions may be formed between a hollow viscus and the gall-bladder. As the calculus passes from the gall-bladder it will then gradually ulcerate into this viscus, and the stone be discharged therein. This most commonly occurs in the case of the duodenum, and the calculus which is often very large, that is too large to pass down the cystic duct, may pass along the small intestine, but often becomes impacted in some part of its course and gives rise to acute intestinal obstruction. In some cases the stone may remain impacted within the fistula for a certain time, when the end projecting into the duodenum may become enlarged, the chyme depositing phosphates upon it as described by Barnard.⁶ Very rarely the stone may make its way into the small intestine by ulcerating into the ileum as in one of the cases reported by Courvoisier.²⁰ In other cases a calculus large enough to cause intestinal obstruction may have passed down the common duct. Stones of this size will have developed in size while impacted in the common duct and may have led to great dilatation of it. Even in such cases it is very probable that a choledochoduodenal fistula has been formed, but that it has not passed through a fistula between the gall-bladder and duodenum is shown by the fact that post mortem such a fistula may be absent. Of his 36 cases Courvoisier was only able to accept four as following this route.

Naunyn in his analysis of 384 cases of fistula found 108 connected with the duodenum, 93 of which came from the gall-bladder, the rest from the common duct. Barnard⁷ found that intestinal obstruction from gall-stones occurred in the proportion of 1 in 44.6 of all cases, in the majority of cases previous symptoms of gall-stones being present. In this series of 409 cases there were 13 cases of acute obstruction in which a previous history pointing to gall-stones was noticed in 8. In addition to these there were 7 others in which a fistula between the gall-bladder and duodenum was found at operation.

Occasionally a calculus having passed within the intestine may cause intestinal obstruction by giving rise to a volvulus, as in two cases recorded by Mayo Robson.⁶⁵

Not uncommonly the fistula may communicate with the transverse colon. In Naunyn's⁷⁸ series there were 49 cases in which the fistula communicated with the gall-bladder and transverse colon, while one passed between the colon and common duct. In this series there were only two such cases. With such a fistula intestinal obstruction is much less likely to be caused, the larger calibre of the colon allowing the calculus to pass, although at times it may be impacted at the anus or may be felt per rectum as in a case recorded by Sir F. Eve.²⁸

Very rarely the fistula may connect the gall-bladder with the stomach. Naunyn gives 12 such cases in his list. Mayo Robson mentions that he has had 5 cases and reports 2 fully. In such cases the fistula usually opens into the pyloric portion of the stomach close to the lesser curvature. The condition may give rise to continuous vomiting of bile-stained material, or the calculus itself may be vomited.

Voelcker¹⁰⁶ has recorded an extraordinary case where three fistulæ were present, opening into the pylorus, duodenum, and transverse colon.

In exceptional cases gall-stones may pass into the urinary passages. Michel⁶⁹ records a case where four calculi were removed from the urinary bladder at one operation, and

Murchison⁷⁰ one where as many as 200 biliary calculi were passed from the urethra. Moynihan⁷⁴ mentions one of his own cases where a stone ulcerated into a renal pelvis dilated behind an impacted urethral calculus. He also quotes cases of Faber Kronlein and V. Bergmann where the stones passed from the gall-bladder through a fistula into a patent urachus and so into the bladder.

In this series there was no actual case of a fistula communicating with the bladder but in one the liver was much prolapsed, and an abscess around the gall-bladder was found at operation to have its lower wall formed of the urinary bladder.

A few cases have been recorded of fistulous communication with the female genital organs, especially the pregnant uterus, but there seems to be doubt in some whether the communication was not really with the vagina. Lucy⁵⁷ records one case where the fistula communicated with an ovarian cyst.

In other cases the fistula may communicate with the thoracic viscera. Naunyn collected 10 such cases, Courvoisier 24. Two cases have been recorded by Rigby⁶³ and Mayo Robson⁶⁶ that were successfully treated by operation. In such cases the communication is probably either made through a subphrenic or hepatic abscess which has perforated the diaphragm.

Lediard⁵² recorded a case in which he removed an appendix containing eleven small gall-stones; these had, however, probably passed into the small intestine and from there into the appendix.

Villous Cholecystitis.—Rarely a chronic inflammatory condition of the gall-bladder is associated with an hypertrophy and overgrowth of the epithelium instead of with ulceration. This change may be diffuse or limited to one small area. The former is the more common. The whole of the mucosa here may be thickened to form a velvet-like lining to the gall-bladder, or if the viscus be distorted and sacculated it may be limited to those areas in contact with the calculus. In any case it is limited abruptly at the origin of the cystic duct.

On section the mucosa is seen to be much thickened, the glandular tubes being stronger and more convoluted than normal.

If localized the condition may form definite papillomata; such conditions are rare, definite papillomata being only noted in three of the cases of this series. Zenker¹¹⁵ has regarded this condition as an early stage of carcinoma. In one of the cases of this series a papilloma sprang from the fundus and filled the gall-bladder, being $2\frac{1}{2}$ -3 inches long. It showed extensive malignant changes.

In many cases of chronic cholecystitis there is a marked prolongation of the right lobe of the liver to form a linguiform process. As Riedel⁹⁰ has pointed out, this is so commonly associated with gall-stones as to be probably in some way dependent upon them. Although as a rule associated with an enlarged gall-bladder, it may be present with a chronically inflamed and shrunken bladder containing calculi. In this series such a prolongation was noted as being present in 8 cases, although it is probable that to a lesser degree it was present in many more. Of these 8 cases, 3 showed a dilated, 5 a contracted and fibrous gall-bladder.

III. *Calculi in the Cystic Duct.*

In many cases the gall-bladder will contract upon the enclosed stones which will be forced down the cystic duct. If the calculi are relatively small they may ultimately traverse the whole length of the cystic and enter the common duct. If very small it is possible that the calculi may pass down the duct and give rise to no symptoms whatever. It may in part be owing to this fact that in so large a number of cases many years may elapse without any symptoms of the passage of stones down the duct, although in the majority of cases it is due to the fact that the calculus has remained fixed within the gall-bladder. In this series there were 258 cases giving symptoms of the passage of calculi down the ducts, of these 182 had a previous history of calculi within the gall-bladder, which in many cases was of several years duration. This was

specially noticeable in those cases where the calculus was impacted in the duct (see later).

Symptoms: The characteristic symptom of the passage of a stone down the cystic duct is an attack of biliary colic. These attacks may be multiple, either because several stones are present or because one calculus too large to pass down the cystic duct slips back to the gall-bladder, only to enter the duct again at a later date.

In many cases, *i.e.*, 182, there were previous symptoms of gall-stone disease, although it is probable that in the remaining 76 there were such symptoms, but in too slight a degree to have made any lasting impression upon the patient's mind. Of these 182 cases 29 showed the more severe diffuse pain, which has been regarded as the clinical evidence of chronic inflammatory changes in the gall-bladder. In some cases this type of pain has been so severe that in the history it is difficult to distinguish between it and true colic. These figures strongly support what Moynihan, Mayo Robson, Sutton, and others have laid so much stress upon, namely, that the presence of colic must be regarded as a late complication of gall-stones rather than as a symptom of their presence. The absence of colic does not in any way negative the presence of gall-stones.

As a rule the attack of colic comes on with remarkable suddenness and is dependent upon no recognizable cause, not uncommonly appearing first at night time. As a rule, it lasts only for a short time and disappears as suddenly as it came, the stone having either passed or returned to the gall-bladder.

If there have been many attacks of colic without jaundice, and no stones have been found in the stools, although searched for carefully, there is probably only a single calculus, whereas if one or other or both of these latter conditions have been noted, probably many calculi are present; but it is only possible to distinguish between the varieties of multiple calculi when one has been passed in the *fæces* and has been examined.

IV. *Impaction of Calculi in the Cystic Duct.*

A stone passing down the cystic duct may become impacted. If this impaction be complete one of two things may happen. If the infection of the gall-bladder is acute, the complete obstruction to the natural path of drainage will be followed by an acute suppurative or gangrenous cholecystitis. If, on the other hand, the infection be less the calculus will remain in position and, since no bile pigments are in contact with it, it will gradually become coated with and probably later completely transformed into pure cholesterin. As already mentioned, Aschoff and Bacmeister³ came to the conclusion that pure cholesterin calculi only occur in sterile bile, while if inflammatory changes are present calcium is also found in the calculus. In this series of cases there were 89 in which at operation a calculus was found impacted in the cystic duct; 21 of these were associated with an acute suppurative cholecystitis. Of these only 2 were noted as being formed of pure cholesterin, although of the 5 cases of pure cholesterin calculi, and the 4 coated with cholesterin which were bacteriologically examined, 7 contained organisms.

These figures therefore seem to show that with laminated or mixed calculi the infection is likely to be severe, but with cholesterin calculi the fluid is certainly not sterile; the explanation probably being that in the highly infective conditions immediate operation has to be done and the mixed calculus is found. If the infection be less severe the calculus grows *in situ*, and pure cholesterin is deposited upon it, the gall-bladder dilating behind it meanwhile.

If the obstruction be not complete the calculus will steadily grow *in situ*, but in this case bile pigment will also be able to trickle past the calculus, so that the newly formed material will contain pigment calcium in addition to cholesterin. If more than one is present they will form together a barrel-shaped mass, the individual stones being faceted on their contiguous sides. As mentioned previously, in such cases the more recently deposited material is often not laminated but forms a homogeneous material on the surface. With a

partial obstruction of this nature one would expect to find a very great dilatation of the gall-bladder corresponding to the condition seen with an intermittent hydronephrosis, and it is interesting to note that Bland Sutton¹⁰ states on this point: "It is also a noteworthy point that the largest gall-bladders which have come under my observation—I mean those big enough to be mistaken . . . for a cystic kidney or even an ovarian cyst—were obstructed by large barrel-shaped calculi of the character just described." In this series there were seven cases in which the gall-bladder was noted as being excessively dilated. In 5 of these the condition was noted as: gall-bladder down to right iliac fossa, greatly dilated, contained 1 pint, contained $\frac{1}{2}$ pint (2 cases). In these 5 cases a column of 3 calculi was found 3 times, 2 calculi once, and 1 mixed calculus once; in the 2 remaining cases the gall-bladder contained 1 pint and $\frac{1}{2}$ pint respectively of mucus, the calculus in these cases being one of pure cholesterin which completely occluded the cystic duct.

In some cases a calculus which is impacted in the cystic duct may be large enough to cause definite effects upon the surrounding structures. The size of the calculus alone is usually insufficient to cause this pressure, but it is aided by the fact that firm adhesions are usually present. Moynihan⁷⁴ records a case where a stone impacted in the lower part of the cystic duct caused fatal pressure upon the common duct and portal vein. McArthur⁶⁷ also records one of pressure upon the common duct. In this series there were 3 such cases, where with a stone in the cystic duct constant jaundice had been present for 3 weeks, 7 weeks, and 5 months respectively, the condition being completely recovered from when the stone was removed from the cystic duct.

Symptoms: As in the last case there is usually a previous history of calculi within the gall-bladder. In this series of 89 cases there were 61 showing previous dyspeptic symptoms and 45 with a history of past attacks of colic.

With impaction three different groups of symptoms may occur:

(a) These commence either with an attack of colic or severe pain of the inflammatory type, the condition soon passing on to one of acute suppurative cholecystitis. In this series there were 21 such cases, 10 of which had had no previous attack of colic, although the size of the stone suggested that it had been present for some years. In such cases it is probable that the calculus was impacted in the gall-bladder, but with the onset of more acute inflammatory changes it became loosened, and was able to pass down and occlude the cystic duct.

(b) In this group the symptoms of impaction also commence with an attack of colic, which may or may not have been preceded by other attacks. This colic gradually decreases and is replaced by a constant dull pain, which is shortly accompanied with dilatation of the gall-bladder. In this series there were 56 such cases.

(c) Less frequently, an attack of colic may be absent, but the patient has complained of dyspeptic symptoms or the more severe refined pain perhaps for some months. At the commencement of or shortly after these symptoms a tumor due to the presence of a dilated gall-bladder can be distinguished. There were 12 such cases in this series.

From a consideration of these symptoms it is not uncommonly possible to diagnose the nature of the calculus and whether it be single or not. Thus, if there be an onset of severe colic followed by symptoms of acute suppurative cholecystitis, sufficient time will not have elapsed for the calculus to have become coated with pure cholesterin, or to have been converted into this substance; it will therefore be either a laminated and faceted or a mixed calculus. If previous to this onset there have been many attacks of colic with jaundice, there must have been other stones which were passed, and therefore the calculi will be multiple, faceted, and laminated. If, on the other hand, this attack of colic be the first one, there is probably a single calculus. Even with such a single calculus there may have been many attacks of colic, but these, although terminating abruptly, will not have been associated with

jaundice. The calculus will have passed back into the bladder and not into the common duct.

If there have been many attacks of colic followed by jaundice, and then one attack is followed by dilatation of the gall-bladder without signs of acute suppurative cholecystitis, the condition for the same reasons is more likely to be due to multiple calculi.

If but one attack of colic has been present, or dilatation has started insidiously after dyspeptic symptoms, and if there is no evidence of acute suppurative cholecystitis, a simple enlargement of the gall-bladder having been present for some months, the condition is almost certainly due to a single calculus, either of pure cholesterin, or with a thick outer layer of pure cholesterin.

If the dilatation be enormous and has existed for many years, the obstruction will probably be due to calculi, often three or four in number, which have only partially obstructed the duct and have been steadily growing *in situ*.

Excepting in the last group of cases, the dilated gall-bladder will not contain bile. In the early stages bile may be present, but once the obstruction is complete this is absorbed, or at any rate disappears and is replaced either by clear mucus, mucopus, or pus alone. The pathological changes and symptoms already described under the various headings of cholecystitis may then be present.

V. Calculi in the Hepatic Ducts.

Calculi are less common in the hepatic ducts than in any other part of the biliary tract. Michaux⁶⁸ has laid stress upon this fact, and regards all such calculi as secondary to stones in the bladder or common duct. In this series of cases there were but four in which it was noted that calculi were present in the hepatic duct. Such calculi may be of two varieties. In the first place masses of pure pigment calcium may be seen which are formed *in situ*. Such a condition is generally regarded as being very unusual, but it is probably not uncommon, the calculi usually, however, passing into the

cystic duct and gall-bladder, and in the latter situation forming a nucleus of one of the more common varieties. Calculi of this nature (Figs. VI, and VIII, Plate I) are not unusual. In this connection it is interesting to note that the calculi shown in Fig. VIII were removed from the gall-bladder of a case from which a large mass of pigment calcium, as shown in Fig. VII, was removed from the hepatic duct, which strongly supports this view as to their origin. Of the four cases of hepatic calculi, three were formed of pure pigment calcium.

In the second place calculi may occur in the hepatic duct in association with those in the bladder and common duct. Such stones are much more commonly of the faceted type. Such calculi are usually regarded as more common, but in this series only one case was noted as containing calculi of this variety, the specimen being preserved in the Hospital Pathological Institute. There is no doubt that these stones have passed backwards from the common duct, as they are always similar in nature to those found in this latter situation. Moynihan's observation⁷⁴ that in all his cases the calculi were easily milked downwards and removed through the common duct incision is in favor of this, as is also the fact that in the case in this series all the calculi were in the lower part of the hepatic duct.

VI. *Calculi in the Common Duct.*

Calculi having passed down the cystic duct will enter the common duct, and may traverse the whole of this to be ultimately passed into the duodenum, so that not uncommonly patients having symptoms of gall-stones may pass them in the fæces, although it must be remembered that in some such cases the calculi have entered the intestine through a fistula. As in the case of the cystic duct, small calculi may possibly pass down the common duct and give rise to no symptoms. The frequency of such a condition is, however, difficult to estimate, as it is relatively rare for the fæces to be carefully examined previous to admission for the presence of stones.

In this series it was only noted in 22 that calculi had been previously found in the fæces; of these only one had not had jaundice. In some cases where calculi are passed and no jaundice is present, a fistula may be present and the calculus thus not have passed down the common duct. Of the above 22 cases only one was found at operation to have a fistula between the gall-bladder and intestine. In this case jaundice had been present. But of the cases of acute intestinal obstruction a note was made of the condition of the gall-bladder in three, all of these showed a fistula between the bladder and intestine. At operation stones may at times be found in the common duct when there have been no symptoms pointing to their presence there. Thus Moynihan⁷⁴ mentions that he has twice found stones in the common duct when symptoms were wholly lacking, and in two cases of this series calculi were found here, with no evidence of past or present jaundice. For this reason the cystic and common ducts must always be examined during an operation for gall-stones.

Symptoms: The characteristic symptoms of the passage of calculi down the common duct are attacks of colic followed by jaundice. Often in such cases there is a previous history of local or diffuse pain due to calculi in the gall-bladder. Later this is followed by attacks of colic unassociated with jaundice and due to the passage of calculi down the cystic duct. Later still jaundice follows the colic, pointing to the fact that the calculus has now entered the common duct. In this series 232 cases in all showed or had a history of jaundice. In 54 of these the patient gave no history of any symptoms previous to the attack associated with jaundice; 138 gave a history of previous symptoms pointing only to calculi in the bladder, until the onset of the attack with jaundice, that is to say, there was no previous history of colic without jaundice; 40 cases gave a previous history of pain and attacks of simple colic.

These attacks of colic and jaundice last, as a rule, but for a few days, unless the stone becomes impacted. During this time the stools may be white or clay-colored and the urine darkly pigmented.

VII. *Impaction of Calculi in the Common Duct.*

When a calculus has entered the common duct it may become impacted and cease to pass downwards. At first this impaction is complete, but later, as described by Osler⁸⁴ and Fenger²⁹ the stone becomes loosened and a certain amount of bile is allowed to pass. This is brought about partly by inflammatory softening of the duct around the calculus and partly by dilatation of the duct behind it, so that often the calculus forms a ball valve. In some cases the duct behind the calculus may be enormously dilated, as in a case reported by Edgeworth.²⁷ In this series there were 75 cases of stone impacted in the common duct. Of these two showed extreme dilatation of the duct. Rolleston⁹⁵ describes a saccular and a cylindrical variety of this dilatation, the former of which is generally limited to the common duct, the latter usually involving the hepatic and intrahepatic ducts.

The calculi may become impacted in any part of the duct, but they are more common in the lower part. Of Courvoisier's²⁰ 123 cases 41 were in the ampulla and 20 close to the duodenum. In any case the calculus may grow *in situ* and, if several be present, may form a column of articulating segments closely fitting the duct. In three cases such a column was present. The outer layers of these calculi may consist of all the normal constituents or may be in large part formed of soft friable pigment calcium. In other cases the greater part of the calculus is thus constituted and forms a soft, putty-like mass moulded to fit the common duct. A mass thus formed in the common duct may be sufficiently large to press upon the portal vein as in a case reported by Westenhoffer,¹¹⁰ where thrombosis of the vein had been caused.

As a general rule the gall-bladder is contracted according to Courvoisier's law. In this series, however, this has not been as constant as is usually reported. Thus of the 75 cases, 58 showed a contracted bladder, this structure being dilated in 17 cases. Courvoisier's explanation of this, which is usually accepted, is that there is old standing cholecystitis which has led to contraction and shrinkage of the gall-bladder. Such an

explanation seems, however, hardly adequate, for, as already pointed out, many cases of impaction of a calculus in the cystic duct show a long previous history of stones in the gall-bladder, and thus similar chronic cholecystitis should be present, but in such cases dilatation is almost the rule. It is more probable that as in the case of impaction of a calculus in the ureter, sudden and complete blockage of the duct is followed, not by dilatation, but by a cessation of the secretory function of the organ behind it. Thus in this case slowly developing or partial obstruction of the duct may be expected to be associated with a dilated gall-bladder. Dilatation of the gall-bladder may, of course, also occur with jaundice if the calculus be impacted in the cystic duct in such a manner as to compress the common duct, as in the three cases in this series, already mentioned, or if the stone be impacted in the opening of the cystic duct and project into the lumen of the common duct so as to obstruct it, as in two further cases in this series.

When the stone has become impacted inflammatory changes are very likely to take place. These may be local or diffuse. In the former case ulceration will occur around the impacted stone and, in the first place, may tend to loosen the calculus. If the condition continues, perforation of the duct may take place, the infected bile escape into the peritoneal cavity, and a diffuse peritonitis be set up. This is, however, rare, only one such case occurring in this series. If the ulceration be more chronic, adhesions may first form between the duct and surrounding viscera, so that as the ulceration continues, fistula between the two is caused. Such a condition is rare, no case being recorded among this series. Courvoisier,²⁰ and Moynihan⁷⁴ have both laid stress upon the fact that a calculus may not uncommonly ulcerate through the intraduodenal portion of the duct into the duodenum, the condition being then often mistaken for a wide-mouthed ampulla. Rarely ulceration of the duct may be followed by stenosis, as in a case recorded by Pye Smith.⁸⁷ Special attention has been drawn to this complication of late years owing to the difficulties in treatment if the condition arise after the gall-bladder has been removed at operation. This complica-

tion seems to be very rare. There was not a single instance of it among these cases.

In other cases the inflammatory changes are more diffuse and may pass up the duct so that a suppurative cholangitis is caused. In this series there were five such cases. The condition, although fortunately not common, is nearly always dependent upon gall-stones. In Rogers' ⁹⁴ series of 20 cases, 18 were due to gall-stones.

If a calculus be impacted in the papilla of Vater pancreatitis may be caused. The acute condition may be due to regurgitation of bile along the pancreatic duct, as has been shown by Halsted and Opie.⁴⁰ Although it is more likely to occur if there be no accessory duct of Santorini, yet it is probably, in the majority of cases, due not wholly to obstruction, but rather to an associated inflammatory change. In any case the acute pancreatitis is most commonly due to the presence of a gall-stone, and Opie⁸¹ has recorded 32 such cases, every one of which was secondary to gall-stone.

Chronic pancreatitis is more common. In this series 24 cases were noted as having a small, hard pancreas, which was considered at operation to be a chronic pancreatitis. Most commonly this condition is limited to the head of the pancreas, and thus according to Opie⁸² does not as a rule lead to glycosuria. Among this series there were three showing glycosuria. In one of them, which has been recorded by Mr. Mansell Moullin,⁶¹ the glycosuria entirely disappeared after removal of the calculus.

Symptoms: As already noted in two cases calculi were found in the common duct with no symptoms pointing to their presence here. In the majority of cases, however, there is definite previous history of calculi in the bladder or of attacks of colic and jaundice pointing to their passage down the ducts. Of the 75 cases of calculi impacted in the common duct, in this series, there were 73 in which colic and jaundice had been present.

The jaundice sets in soon after the onset of colic, and within a day or two is very marked. If the stone becomes impacted it generally persists, but may be very variable,

probably owing to a certain amount of the pent-up bile making its escape around the calculus. With this jaundice there is more or less aching pain in the right hypochondrium, and in the early stages the liver is often felt to be enlarged. During the course of the condition the patient is very liable to exacerbations of severe pain, during which the jaundice is greatly increased and the enlargement and tenderness of the liver become more marked. With this jaundice there is the customary itching of the skin. In some few cases this irritability may appear in advance of the jaundice.

The amount of bile in the stools and urine will vary with the jaundice. In many cases the patient will notice that the stools have been white or clay-colored with the more acute attacks, but have regained their normal appearance during the intervals.

Charcot¹⁸ first pointed out that with calculi in the common duct there was very commonly intermittent fever. In some cases this may simply be a sharp rise of temperature with a subsequent rapid fall, resembling that of a malarial attack. In other cases there may be slight shivering followed by sweating, or in the more severe types there is a definite rigor. Budd¹⁵ has pointed out the close resemblance of this condition to urinary fever and inferred that both were nervous in origin. Like the urinary condition they are, however, almost certainly due to toxic absorption. These febrile attacks are seen almost constantly with exacerbations of pain and jaundice mentioned above. Of these 75 cases, 58 were noted as showing one or other of the above types of febrile attack.

As pointed out by Moynihan⁷⁴ and Fenger²⁹ loss of weight is one of the most marked and characteristic symptoms of impaction of a calculus in the common duct, and it must not therefore be regarded as evidence of obstruction from malignant disease. In this series 21 cases were noted as being markedly wasted.

VII. *Carcinoma of the Gall-bladder.*

Carcinoma of the gall-bladder is not an infrequent complication of gall-stones, although there is considerable varia-

tion in the statistics given by different observers. Thus Slade,⁹⁹ out of 33 cases of gall-stones examined post mortem, found 16 in which the condition had been treated by operation. Of these, 56 per cent. were complicated by carcinoma. Hale White¹¹¹ and Ticehurst¹⁰⁴ found that of 333 cases of gall-stones at Guy's Hospital 45 had primary carcinoma of the gall-bladder. Riedel,⁹¹ on the other hand, found primary carcinoma in only 28 per cent. of all cases of gall-stones. In this series they were even less frequent. Among the 409 cases there were only 18 showing definite carcinoma.

Carcinoma is, however, very frequently associated with calculus. Thus Zenker¹¹⁵ found them in 85 per cent. of the cases of carcinoma, Courvoisier²⁰ in 91 per cent., whilst Janowski⁴⁷ found calculi in every one of his 40 cases. That the carcinoma is secondary to the calculi, and not the calculi to the carcinoma, is shown by the fact that Siegert¹¹⁶ found calculi in 94 out of 99 cases of primary carcinoma, but in only 2 out of 13 secondary cases. In many cases of primary carcinoma there is, however, a long previous history distinctive of gall-stones. Thus in these 18 cases, there were 7 giving a history extending back over 2½ years; in 2 it was over 5 years, and in 2, over 20 years.

Candler¹⁶ finds that gall-stones are more frequent in lunatics, being found in 14.13 per cent. among 2228 post-mortems, thus supporting the figures of Beadles,⁸ who found them in 27 per cent. of the females and in 5 per cent. of the males dying at Colney Hatch Asylum, and of Warnock¹¹³ who found them present in 50 per cent. of the females and in 11 per cent. of the males dying at Peckham House Asylum. Among them, however, there is apparently no relative increase in the frequency of carcinoma. Among Candler's 315 cases of gall-stones only two had a definite primary carcinoma.

Of greater importance than the above question is the frequency of carcinoma in the gall-bladder after the calculi have been removed, for if this be a common complication it will be a strong point in favor of removing every diseased gall-bladder. This condition seems, however, to be very unusual. Among this series there were only three such cases,

one of which has been fully reported by Mr. Lett;⁵⁵ in the other two the carcinoma appeared over one year after the first operation. Very few of these cases are to be found in the literature; one, however, was fully recorded by Knaggs.⁵⁰

In the majority of cases the carcinoma is of a columnar or cuboidal-celled variety; in certain cases, however, the nature of the epithelium may be changed apparently owing to the chronic inflammatory condition, and a squamous-celled carcinoma may thus arise. Fütterer³⁴ has collected 13 cases of this variety. In this series of 18 cases none were noted as being squamous-celled.

In conclusion I must acknowledge my great indebtedness to the members of the surgical staff of the London Hospital for granting me permission to use the statistics of their cases in the compilation of this thesis.

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A DOUBLE GALL-BLADDER REMOVED BY OPERATION.

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WHILE several cases have been recorded in which the fundus of the gall-bladder was bifid and its cavity separated into two for a portion of its length, I have only been able to discover one in which there were two complete cavities each possessing its own cystic duct. This specimen was found post mortem.¹ The following is, I believe, the first instance in which a double gall-bladder has been removed at operation.

J. A., a woman of twenty-five, was admitted into the London Hospital under my care in July, 1910, with the following history: As long as she can remember she has had pain half an hour after food, in attacks of about a month's duration. The pain starts in the right hypochondrium, passes to the right shoulder, and is relieved by belching. In December, 1909, she was roused one morning in the early hours by a severe attack of colicky pain starting in the right hypochondrium. It doubled her up, and was accompanied by sweating and retching; a few days later she had a similar attack. She has had none since then, but her "indigestion" has been very bad. No history of enteric.

On examination slight, deep tenderness was present in the gall-bladder region. I believed her to be suffering from cholelithiasis, and accordingly operated on July 20, 1910. On opening the abdomen through the right rectus muscle, I found a distended gall-bladder which I could not empty. On tracing the cystic duct downwards to discover the cause of the obstruction, I came upon a firm nodule which I took at first to be a calculus. As it was apparently firmly impacted, I cut through the peritoneum covering the duct and discovered that the supposed calculus was a thickening in its wall about three-quarters of an inch from its junction

¹ Purser: British Medical Journal, 1886, vol. ii, p. 1102.

FIG. 1.



Double gall-bladder removed by operation. Specimen in Museum of Royal College of Surgeons of England (No. 561.31).

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with the common bile-duct. I ligatured and divided the duct and then found that I could not strip up the gall-bladder in the usual way, and the duct tore just above the nodule in the attempt. On further dissection I found another duct, which I ligatured and divided, covered the stump with peritoneum and closed the belly.

On examining the specimen² the two ducts were at once evident, and closer examination revealed another sac above and completely concealed by the distended lower one. On dissection (*vide figure*) two complete gall-bladders were evident, joined only along a narrow portion of their circumference. The larger one contained thick bile-stained mucus, the smaller thin bile. On examining the portion of cystic duct belonging to the larger gall-bladder, I found it patent at its common duct end; at the site of the nodule its lumen was a little increased in size and ulcerated as if from the lodgement of a calculus. Above this it appeared to be obliterated.

Microscopic examination showed the nodule to be composed of fibrous tissue with glands resembling Brunner's glands; below this the appearance of the duct was normal.

The cause of the distention of the gall-bladder seems to have been a fibrous stricture of the duct. Whether this was due to inflammation of the aberrant Brunner's glands or to the temporary lodgement of a calculus there is no means of knowing. I think the former hypothesis the more probable.

² It is now in the Museum of the Royal College of Surgeons of England (Number 561.31).

PRIMARY OVARIAN PREGNANCY.

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OF TROY, N. Y.

WITH the possible exception of abdominal pregnancy, primary ovarian gestation is the rarest of all forms of pregnancy. Many cases have been reported as ovarian which were probably tubo-ovarian.¹ In 1878 Spiegelberg² formulated certain conditions which must be fulfilled in order to justify a diagnosis of ovarian pregnancy. He demanded that (1) the tube on the affected side must be intact; (2) the fetal sac must occupy the position of the ovary; (3) it must be connected to the uterus by the utero-ovarian ligament, and (4) definite ovarian tissue should be found in the sac wall. Most of the gynæcological works have little or not anything to say on the topic. Williams³ in his text-book has gone into the subject exhaustively. He demands that ovarian tissue must be found to be present at different and all places in the sac wall. The condition is important for the good reason which Norris¹ points out, that in certain cases of tubal or broad ligament pregnancy, the ovary may be found flattened out against the gestation sac and to a certain extent forming a portion of its wall. In addition to these requirements, the tube on the affected side should not only be intact, but should be microscopically free from any evidence of gestation. Etiology, impregnation and fertilization of the ovum in the Graafian follicle.

Symptoms and Diagnosis.—I know of no way or any tangible reason why any one should make a correct diagnosis of primary ovarian pregnancy. It is significant and sufficient only that a diagnosis of extra-uterine pregnancy exists. The symptoms are those of an extra-uterine pregnancy, with all the possibilities of a fatal termination unless the condition is decisively attended to. In fact, Croft's case lost her life from severe hemorrhage. It is with some hesitancy that one accepts a diagnosis of ovarian pregnancy. Especially is this true when one, after reporting an ovarian pregnancy, as proven by the author, is confronted while reading an author of a little later date by a critical doubt whether the case was a true ovarian pregnancy. It seems to me, however, that it is only fair to believe that the man who reports a case has

a better and more comprehensive understanding of the true picture which it presented than the man who, from a critical standpoint, judges only from the printed account of the case. While I believe that certain rules must be followed, still I am of the opinion that every man should be given credit for a true diagnosis on his own personal observation of the condition present, and that the burden of proof rests with the critic to prove beyond a doubt that the case, after being reported in the literature, is not an ovarian pregnancy but is, of a certainty, either some other anatomical pregnancy, or that no pregnancy existed as reported.

REPORT OF THE CASE.—Miss — age twenty, born in the United States, family history negative. Menstruated first at fourteen, regular lasting four or five days. Some pain, especially first day. Menstruated last April 12, 1908. Started flowing about June 14, 1908, continued to flow until sent to the hospital, June 28, 1908, for a curettement and a better examination under ether. The tip of the cervix was soft, the os patulous and bleeding. The uterus boggy, somewhat enlarged. A mass the size of a large orange was felt in the left side of the pelvis; right side free. Breasts somewhat enlarged, containing some colostrum.

Operation at Troy Hospital, June 28, 1908. Median incision; a mass of about the size of an average orange occupying the left ovary was delivered. The tube and ovarian mass was cut away. The right tube and ovary were apparently normal and were not touched. A chronically inflamed appendix was removed. On opening the ovarian mass a partly formed embryo, of about six weeks' development, was liberated. The tube was apparently normal and was not attached to the ovarian mass. The ovarian mass was not adherent to any surrounding structure.

Pathological Report.—Gestation sac contained ovarian tissue; tube normal, no evidence of impregnation found in the tube.

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- ² Arch. f. Gyn., 1878.
- ³ Williams' Text-Book.

CONCERNING THE TREATMENT OF TUMORS OF
THE URINARY BLADDER WITH THE OUDIN
HIGH-FREQUENCY CURRENT.*

BY EDWIN BEER, M.D.,
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IN the May 28, 1910, issue of the *Journal of the Amer. Med. Assoc.*, I reported a new method of attacking vesical neoplasms, and mentioned the immediate effects seen in the two extensive primary tumors thus treated. In that preliminary report I promised to publish at some future date the full details of these cases. In this paper I wish to present these cases in some detail, calling attention to the end results, the greater part of a year having elapsed. I shall also avail myself of this opportunity to mention some corroborative experiences of others as well as of myself in this new therapeutic work.

CASE I.—Mrs. J. S., 81 years, Hungarian. On Feb. 24, 1910, admitted to Mt. Sinai Hospital, First Surgical Service.

Past History.—Menopause 31 years ago. Typhoid fever at 18 years.

Present trouble began two years ago with hæmaturia. During intervening period has had hæmaturia irregularly. At first less frequent, now more frequent. Hæmaturia at present has continued for a month. Between attacks she passes clear urine. During attacks there is increased frequency. Has had pains in both lumbar regions. Has lost weight. Has not passed gravel or calculi. Chief complaints, hæmaturia without pain, and loss of weight and strength.

Physical Examination.—Poorly nourished, very anæmic old woman. Lungs show signs of emphysema. Heart shows systolic murmur at the apex as well as at base. Pulse is high tensioned, vessels are sclerosed. Liver and spleen are negative. Right kidney is palpable. Hæmoglobin 23 per cent. Red blood-cells

* Read in part before the New York State Medical Society, April, 1911.

1,664,000. Urine is bloody in color, alkaline, 1022, moderate amount of albumin. Microscopically it is loaded with red blood-cells and white cells.

March 4, 1910: *Cystoscopy and treatment of tumor with high-frequency (Oudin) current introduced through catheterizing cystoscope.* A cauliflower tumor surrounded the position of the right ureteral meatus, extending well to the right towards the lateral wall. The villi were very exuberant, protruding approximately 2 cm. into the bladder's lumen. The shape of the growth was slightly ovoid and in size it was as large as a dollar piece, the main part of the growth being to the right of the right ureteral meatus and apparently sessile. The Oudin current—without resistance—applied at three points: two at the base, 15 seconds each, and one among the villi for 30 seconds, making one minute in all (Fig. 1).

March 6, 1910: Bleeding continues. Patient complains of burning on micturition; also of increased frequency.

March 7, 1910: *Second treatment for 2½ minutes through cystoscope.* The three points of application of March 4 are distinctly visible, the shorter applications as white necrotic areas, while the longer application shows a gray-black necrotic crypt, more than twice the size of the areas affected by the shorter applications. At the second treatment five points of application made for 30 seconds each, the electrode being buried among the villi. Marked formation of gas was noted and tumor tissue regularly becomes adherent and baked to electrode. The insulating rubber at tip of electrode regularly softens and melts, exposing the copper cable which necessitates withdrawal of electrode and cutting of same so as to make rubber flush with cable. No sparks visible. At this seance and in all subsequent ones the rheostat lever was placed vertically, allowing much less current to flow into the electrode than at first treatment, as I wished, naturally, to exercise every precaution.

March 9, 1910: *Third treatment lasting 3½ minutes, 30 seconds at each site.* The surface of most of growth is necrotic, and goodly sized pieces of dead tumor tissue break off readily and some were recovered for pathological examination. Applications made at seven points. Pieces of tumor became baked to electrode and were removed for microscopic examination. (Diagnosis papilloma. Impossible to say from small specimen whether

carcinoma is present in deeper layers.) During this treatment bleeding set in and by local application of the current it was controlled.

March 11, 1910: *Fourth treatment through cystoscope, 1½ minutes application of current.* As whole tumor seemed necrotic after the previous treatments aggregating seven minutes in all, the fourth treatment was very brief, lasting only 1½ minutes. Carbonized pieces of tumor came away after this treatment (Fig. 2). Patient still complains of bladder irritability. The trigone is reddened, whereas the mucosa of the rest of the bladder is normal. Urine is almost clear, and contains regularly pieces of necrotic tumor appearing as dead white débris.

March 17, 1910: *Fifth application lasting 1 minute*, made as a demonstration of method for Drs. Keyes and Barringer. The tumor is dead grayish white, and whole surface appears necrotic, so that large pieces can be broken off without bleeding. The extreme right pole of the tumor shows a small pink-red nodular area, flattened on the bladder wall. This was cauterized for 1 minute. Under the current the mass became black—carbonized—in spots and white in others. Loose pieces of tumor débris are seen lying on bladder floor.

March 17, 1910: Bladder irrigations begun to help separation of necrotic tissue and wash débris away. Urine is clear. No more blood.

March 26, 1910: Cystoscopy. The tumor has changed very much in appearance. It is smaller and much flatter. Between the necrotic villi that are still attached the deep red velvety mucosa is seen in many places. With Blum's snare and forceps large masses of necrotic tumor are readily torn away from the rest of the growth without causing any bleeding, exposing large areas of red bladder wall.

March 31, 1910: Cystoscopy. The appearance of the necrotic growth is much changed. Almost all the tumor has separated flush with the bladder mucosa and normal mucosa separates the two poles of the growth. In this area the normal ureteral meatus is now visible for the first time. It is apparent now that there were three distinct papillomata, growing in close proximity, separate at their bases and confluent superficially.

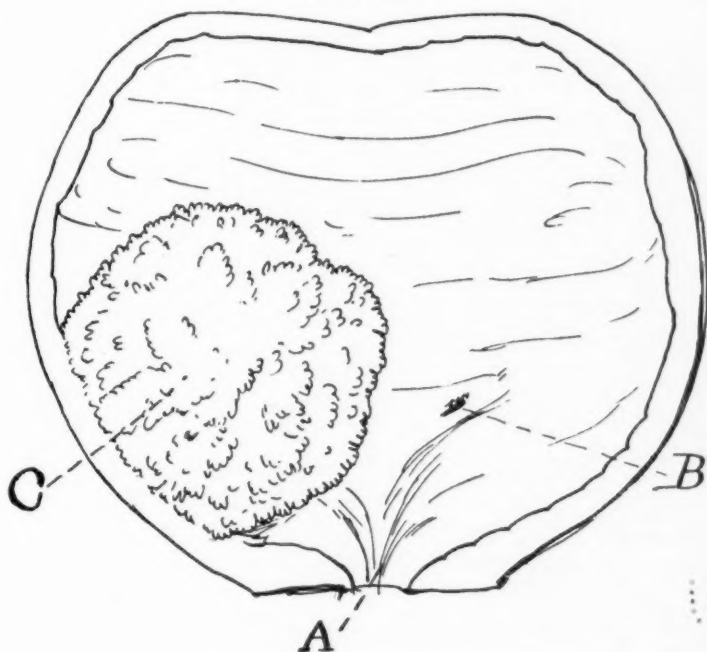
April 3, 1910. Cystoscopy. More of the necrotic tumor has separated, so that the ureteral meatus is even clearer and sur-

FIG. 1.



Case I.—F., 81 years, Feb., 1910. Two years' history of attacks of hæmaturia. Present attack began one month ago. Cystoscopy showed a large papillary growth stained with blood, surrounding the right ureter. The base was sessile and the villi were very delicate.

KEY TO FIG. 1.



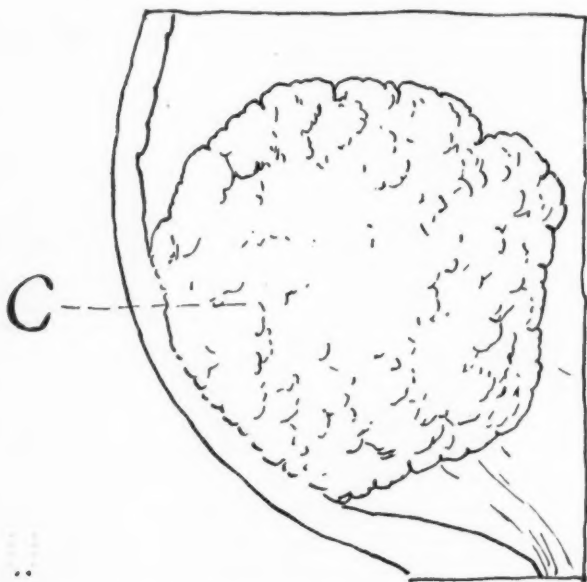
Shows posterior wall of bladder. A, neck of bladder; B, left ureteral ostium; C, large villous growth surrounding the right ureteral ostium.

FIG. 2.



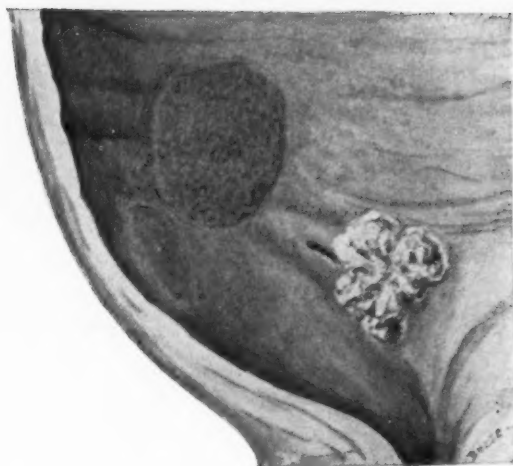
Case I (March 11, 1910).—The tumor having been treated for seven minutes has become totally necrotic. Microscopic diagnosis, based on recovered fragments, papilloma (impossible to say from specimen whether carcinoma is present in the deeper layers).

KEY TO FIG. 2.



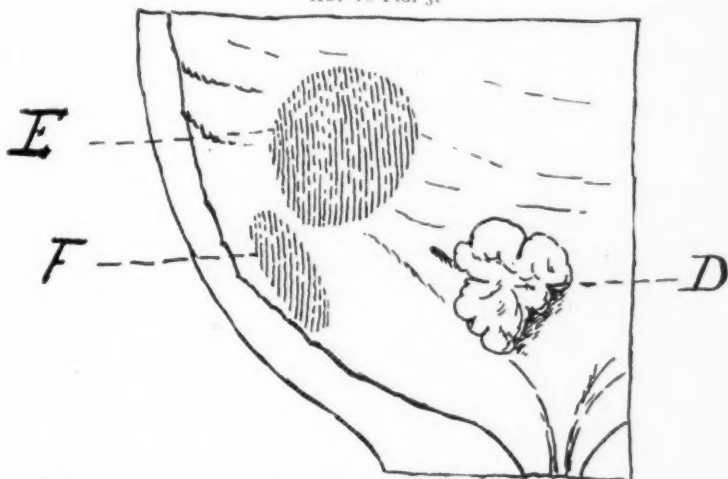
Shows the portion of bladder occupied by the growth C, which is now totally necrotic superficially, and the villi are no longer distinct.

FIG. 3.



Case I (April 6, 1910).—Most of the necrotic tumor has been thrown off. A small necrotic mass still adheres close to right ureter, which is patent to catheter No. 6, French. Well off near lateral wall, two small areas of apparently viable tumor. As the necrotic area separated completely, its base and the two more laterally placed, slightly raised, suspicious areas were treated, and since May 11, 1910, patient's bladder shows no sign of previous disease.

KEY TO FIG. 3.



D still shows adherent necrotic villi; *E* represents base of one of the original papillomata; *F* represents base of the third papilloma.

M70U

rounded by healthy mucosa. The tumor base is more nearly level with the bladder, and what is left is in great part necrotic, though here and there distinct pinkish red areas (viable tumor ?) are seen. Mass D (Fig. 3), though totally necrotic, floats freely as a pedunculated piece of tissue still adherent to the bladder wall, mesial to the ureteral meatus, attached at its base.

April 6, 1910: Cystoscopy. The necrotic tissue is still separating and tumor base shows almost smooth mucosa with two small papillary areas partially covered with necrotic surfaces. These are situated at E and F in Fig. 3. After further separation of the slough the velvety red areas appeared. Mass D is also seen in this picture still attached to bladder wall.

April 9, 1910: Hæmoglobin is 65 per cent. Cystoscopy. Right ureter is catheterized, its lumen being uninfluenced by the removal of the growth, admitting readily No. 6 French. The necrotic mass D is smaller. When pushed by the catheter, mucosa is seen to encircle its base completely. To the right of the right ureter is normal mucosa except at the two spots or velvety red areas mentioned above, the bases of the two papillomata. These areas look spongy and, being slightly raised, I suspected that they were remnants of the tumor and treated them accordingly.

April 14, 1910: *Cystoscopy and high-frequency application* to the two flat masses E and F (Fig. 3) and to the base of D, the pedunculated necrotic mass having separated since the last examination. Applications to these areas lasted 5-15 seconds, aggregating 1¼ minutes in all.

May 11, 1910: *Cystoscopy and high-frequency for 1½ minutes in all, 10-15 seconds each application.* The mucosa at site of D (Fig. 3) is absolutely normal. The two flat areas treated on April 14 are minute, and the one that received the more active cauterization has almost entirely disappeared. Both of these areas were again treated with high frequency. The rest of the bladder is absolutely normal.

After this treatment the patient returned to her home again, having been discharged shortly after the April 14 treatment.

June 1, 1910: *Cystoscopy and high-frequency for one minute.* The areas treated at the last session show small central sloughs surrounded by hemorrhagic mucosa. Though no definite signs of tumor are visible, these same areas were again treated.

June 29, 1910: Cystoscopy. No signs of tumor are visible. Two minute sloughs with radiating areas indicate areas cauterized at last session. As there were no suspicious spots no high-frequency treatment was given.

Aug. 10, 1910: Cystoscopy shows an absolutely normal bladder. No evidence of scar tissue. Mucous membrane is absolutely smooth and normal in every particular. (Demonstrated to Dr. A. V. Moschowitz.)

Nov. 15, 1910: Cystoscopy. Patient shows absolutely normal bladder. Slightly white mucosa (scar tissue?) at site of original growth and fine new formed vessels in this vicinity. Patient's urine is clear but there is still some increased frequency. (Demonstrated to Drs. Gerster and Lewisohn.)

Jan. 4, 1911: Cystoscopy shows normal bladder. (Demonstrated to Dr. Ware.) No sign of recurrence.

March 8, 1911: Cystoscopy shows normal bladder. (Demonstrated to Dr. Hyman.)

April 14, 1911: Cystoscopy shows absolutely normal bladder. (Demonstrated to Drs. Braasch, Herrick, and Hyman.)

July 7, 1911: Cystoscopy shows normal bladder.

Remarks.—In this patient of 81 years the condition was considered inoperable. The large papillary growth made up of three confluent tumors surrounded the right ureter. To remove the growth and reimplant the ureter would have been too severe a strain for this anæmic old woman. In 8 seances, aggregating $13\frac{1}{4}$ minutes application of the Oudin current, the tumor was painlessly destroyed and the patient has been completely restored to health. There is no sign of recurrence.

CASE II.—Mrs. E. K., 66 years, German. On April 6, 1910, admitted to Mt. Sinai Hospital, First Surgical Service.

Past History.—Menopause 16 years ago. Had six children and three miscarriages.

Present trouble began 10 years ago. Symptoms at that time were hæmaturia lasting several weeks, increased frequency of urination, and burning on urination. Three years ago (June, 1907), had second attack of hæmaturia lasting three months. At this time I cystoscoped the patient at the German Hospital and found a papillary tumor the size of a hazel-nut a little to the left of the left ureteral meatus. The patient refused operation.

One year ago the third attack of hæmaturia began. This lasted two weeks. Nine weeks ago the present fourth attack began. The urine is very bloody and frequently contains large clots. Urination is every half hour during the daytime and three or four times at night. At present there is marked tenesmus. Patient has lost much weight and is steadily growing weaker. Two days ago she fainted.

Physical Examination (abbreviated).—Very feeble, very pale old woman, showing all the signs of a chronic progressive anæmia. Lungs, heart, liver, and spleen normal. Hæmoglobin 45 per cent. Urine is intensely red in color, resembles pure blood.

April 6, 1910: *Cystoscopy and 4 minutes' application of the high-frequency current (Oudin) to the papillary tumor.* As soon as the patient was admitted the treatment was instituted with the object of immediately controlling the excessive bleeding. Cystoscopy was almost impossible, and I doubt whether I could have located the growth without an air cystoscope, if I had not made notes of the position of the tumor three years earlier (Fig. 4). The active bleeding was uncontrolled by 1 per cent alum solution as well as by cold water. A view of the tumor was obtained only after a great deal of irrigation and filling of the bladder through the cystoscope while searching for the growth. As soon as it was located, the high-frequency current was applied at eight different points for thirty seconds at each. This controlled the bleeding almost completely at once. Even directly after the first application the bleeding was sufficiently controlled to allow me to get a fairly distinct picture of the growth, making subsequent applications much simpler.

The tumor was as large as a walnut. It was coarsely papillary and sessile. It lay 1.5 cm. to the left of the left ureteral meatus. It was stained with blood pigment. Specimen sent to pathological laboratory.

April 7, 1910: By this morning the urine was clear. There was no pain in bladder or urethra. No irritability. The specimen of tumor which had been removed, baked to electrode, shows papilloma (partly charred).

April 11, 1910: Urine has continued free of blood. *Cystoscopy (second) and high-frequency application for 4½ minutes.* The tumor is smaller, and many small fragments are lying free in the bladder, the anterior half of the growth is beginning to necrose whereas the posterior half is still pink in color. The

current was applied to this part, and at superficial points of application the tissue became white about the carbonized centre where the electrode established the contact. Frequently the tumor became so adherent to the electrode that, on drawing on same, it looked as if the whole tumor could be pulled from the bladder wall. This occasioned slight bleeding once, which was at once controlled by an application of the current. The rest of the bladder mucosa shows no sign of irritation.

April 13, 1910: Cystoscopy (third). The tumor is smaller and seems necrotic. The patient was then discharged with orders to return in four weeks, allowing this period for the process of sloughing to take place.

May 25, 1910: Owing to unfortunate circumstances treatment was discontinued up to date. There have been no symptoms referable to the tumor.

Cystoscopy and high-frequency for 5 minutes (30 seconds application). The tumor is about half its original size and its structure is very fleshy and very firm.

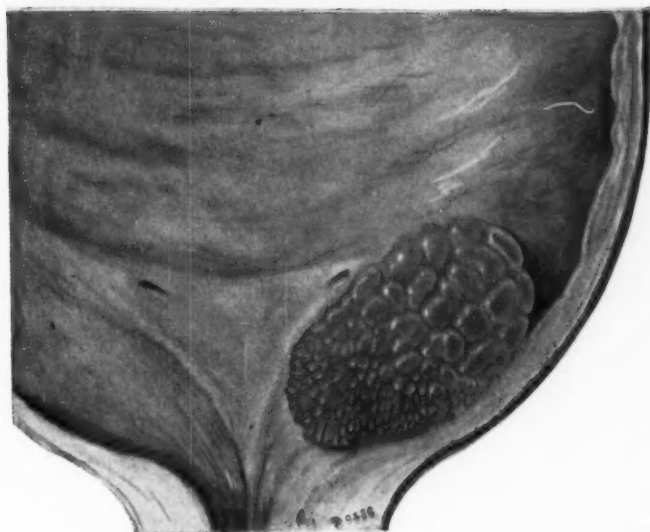
Fig. 5 represents the condition very admirably. Papillary outgrowths and thick villi have disappeared completely. This peculiar lobulated mass covered with mucosa seems to be a stage in the retrogression of the tumor. Attempts at cauterizing the remains of the "growth" caused some pain, perhaps owing to the fact that I was treating the thickened bladder wall, which, as stated, at times reacts in this way while the tumor is retrogressing. An extensive linear burning of a large part of the surface of the "growth" was made (Fig. 5).

June 8, 1910: *Cystoscopy and high-frequency for 30-40 seconds.* At the site of the tumor no projecting tissue is visible. There is a small linear slough marking the points of application of the current at last treatment. Adjacent to this a few brief applications were made aggregating in all about 30-40 seconds. Whether some minute vestiges of neoplastic tissue still persist despite the fact that they are not visible through the cystoscope, time alone can tell. Patient ordered to return in four weeks.

July 6, 1910. Cystoscopy shows no signs of recurrence. A minute slough is still attached at original site of tumor and from this the mucous membrane is thrown into radiating folds as if drawn by scar tissue formation into this condition.

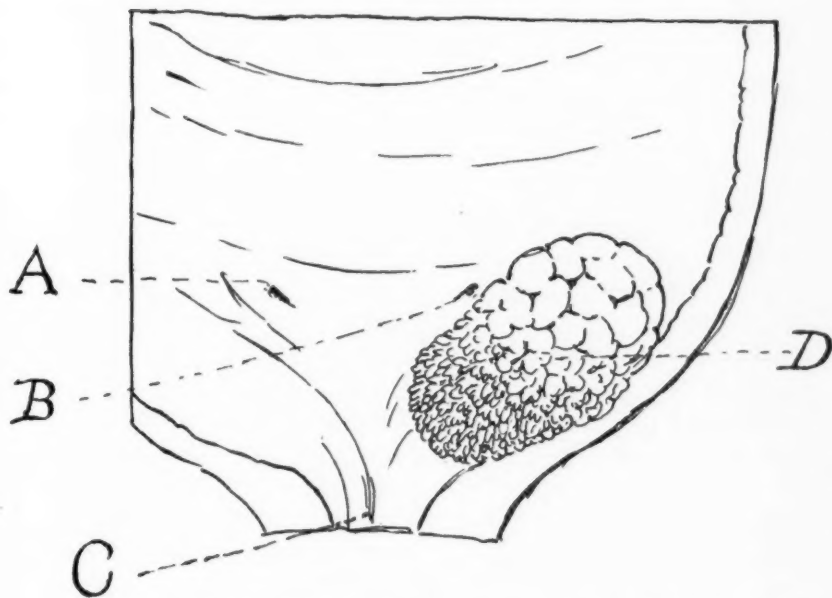
Aug. 31, 1910: Cystoscopy. Bladder is absolutely normal.

FIG. 4.



Case II.—F., 66 years, April, 1910. Ten years' history of hæmaturia. Present attack began nine weeks ago and is very severe. At first treatment bleeding ceased, so that tumor could be readily seen in subsequent examinations. It was made up of fine villi and coarse bulbous papillæ. It was well stained with imbibed blood and sessile. It was much flatter than the tumor of Case I.

KEY TO FIG. 4.



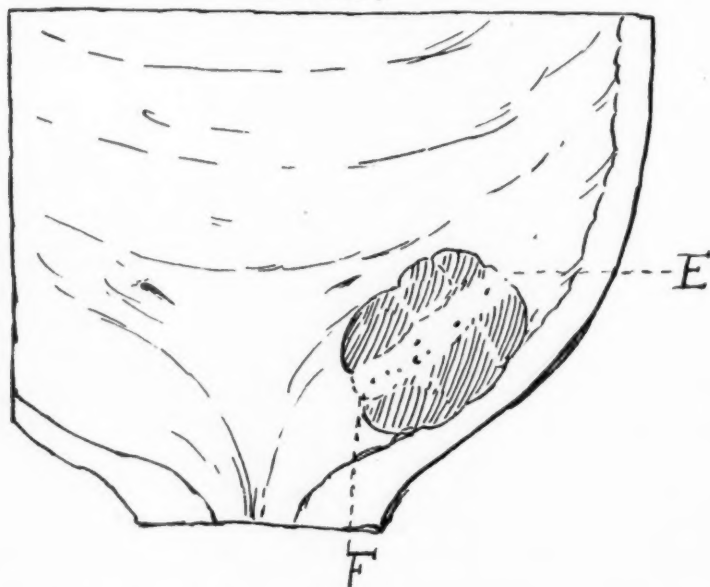
Shows posterior wall of bladder. A, right ureteral ostium; B, left ureteral ostium; C, neck of bladder; D, coarse papillary tumor.

FIG. 5.



Case II (May 25, 1910).—The tumor is less than half its original size. The necrotic villi, etc., have been thrown off, and a rather flat, lobulated, very firm mass remains at the site of the original growth. This, I believe, is an involution form or a stage in the retrogression of the original tumor. At that time I thought it rather hopeless to attempt to destroy such a solid growth, but nevertheless gave the patient five minutes' treatment, producing the irregular white and black eschar across its surface. On June 8, 1910, there was no sign of any previous tumor in the bladder, and since then there has been no recurrence.

KEY TO FIG. 5.



Shows marked change in appearance and size of the lesion. *E* to *F* shows line of application of the current as white scorching with black spots of charring.

(Demonstrated to Drs. A. V. Moschowitz, Lewisohn, and others.)

Oct. 26, 1910: Cystoscopy (21 weeks since last treatment). Bladder is absolutely normal.

Jan. 4, 1911: Cystoscopy shows absolutely normal bladder. (Demonstrated to Dr. Hyman.)

March 8, 1911: Cystoscopy shows absolutely normal bladder. (Demonstrated to Dr. Hyman.)

April 14, 1911: Cystoscopy shows absolutely normal bladder. (Demonstrated to Drs. Braasch, Herrick, and Hyman.)

July 7, 1911: Cystoscopy shows normal bladder.

Remarks.—In this patient there was a fair sized sessile growth which was bleeding very actively. The very first application and the very first treatment controlled this, so that the urine was absolutely clear twelve hours after the treatment and has remained so ever since. This growth was about half the size of the growth in Case I, and by means of the treatment employed in 4 seances aggregating 14 minutes' application the growth was totally destroyed. Had I understood the significance of the picture represented in Fig. 5, I probably would have dispensed with the last two seances and consequently have cured the patient after only 8½ minutes' treatment. This patient continues in the best of health. There is no sign of recurrence.

In addition to the above I have had eight other opportunities to study the effects of the Oudin current on vesical growths, and I shall report these experiences briefly at this time.

CASE III.—Male, 54 years. In this patient symptoms of tumor dated back 22 years. Examination showed the most extensive primary papillary growth that I have ever seen. The tumor stretched from the neck of the bladder across the trigone, over the left ureter and the left two-thirds of the trigone, thence up the left lateral and posterior walls to well above the equator, taking in between one-quarter and one-third of the whole bladder wall. This patient was difficult to treat, not only because of the great size of the growth but also on account of severe bleeding and of bladder irritability. In 9 seances aggregating 34 minutes' application of the current the whole tumor was destroyed and gradually thrown off in large and small pieces. The pa-

tient is in excellent health and has gained 32 pounds. Judging from the experiences in Cases I and II, this patient seems cured.

CASE IV.—Female, 67 years. Referred to me by Dr. S. Brickner. This patient had suffered for some years with painless hæmaturia. The first and only treatment was given during severe bleeding. The brief treatment had practically no effect on the bleeding, and while I was waiting for it to subside a little, so as to make inspection of the apparently very large growth more easy, four days after I had treated the patient she fell over dead while sitting at breakfast. During the previous days she had felt perfectly well, having been up in a chair most of the time.

Whether we are to connect this sudden death with the treatment or not is difficult to decide. No autopsy was granted, so that we cannot state whether death was due to a sudden hemorrhage in the brain or an embolism. The family of the patient had been told by the family physician that owing to her cardiac condition she would die suddenly, as she did. Be that however as it may, I suppose an embolism might arise from a bladder growth, and such an occurrence must be considered a possibility though very improbable, judging from all experience up to date. Cases V and VI had four papillomata, and in these the use of the high-frequency current was most effective in destroying the tumors. They responded just as well as the Cases I, II, and III, and appear to be well on the high road to complete and permanent cure.

To recapitulate, therefore, I have treated successfully up to date five cases of primary papillary tumors of the bladder, aggregating 9 distinct tumors, with this new method, and judging from the results in Cases I and II, it seems clearly demonstrated that these cases can be cured definitely in the manner here described.

In addition I have treated two cases of recurrent papillary tumor of the bladder. One case is still under treatment, and a large part of the very extensive growth has been thrown off. The original tumor was excised some years ago and was diagnosed as carcinoma by a competent pathologist. Whether

patient and conscientious treatment in this particular case will lead to a cure it is impossible to say up to date.

The other recurrent case could not be adequately treated, as the old suprapubic wound opened up and the patient gradually developed a fatal renal insufficiency. As the result of one treatment in this case, larger pieces of the papillary growth sloughed away, as in all the other cases. These two cases were the most difficult to treat, as their tumors were most extensive and could not be seen in their entirety with either the indirect or direct vision cystoscope. Both instruments had to be used in applying the current. Both cases illustrate the inefficiency of the suprapubic method, as well as the fact that many of these cases are worse off after such an attempt at removal than they are with their original growths (Cases VII, VIII).

Two undoubted cases of carcinoma of the non-papillary type I had an opportunity to treat. As was to be expected my results were negative. They were extensive growths, and as they were very firm I desisted very quickly (Cases IX, X).

The Experiences of Others.—It is most gratifying to find that a number of surgeons have already tested this new method and are satisfied with it. Dr. E. L. Keyes, Jr., has published his early experiences in the *American Journal of Surgery*, vol. xxiv, No. 7, July, 1910. Drs. L. Buerger and A. L. Wolbarst have published theirs in the *New York Medical Journal*, Oct. 29, 1910, and Dr. J. F. McCarthy has read of his results at several medical meetings.

Through the courtesy of these gentlemen and through that of Dr. C. Elsberg and Dr. M. Ware, I have been able to gather from the experience of all these surgeons a large number of papillary tumors of the bladder that have responded to the high-frequency treatment as satisfactorily as the cases I have detailed above *in extenso*. From correspondence with these surgeons who have treated in all 27 papillary growths, I see that their experiences coincide closely with my own and that they all prefer this simple method of attack to the older operative method. Whether most of these 27 tumors are permanently cured it is too early to say. Dr. Keyes writes that nine

tumors of his series he considers cured, such cures being verified by cystoscopic examinations in one case twelve months, in another nine months, in still another six months after destruction of the original papillomata. Of Dr. Buerger's cases, two controlled in the same way have remained well the greater part of a year also, whereas in another case, as in that of Dr. Elsberg, a new tumor developed in another part of the bladder. These metastases are responding, both gentlemen inform me, just as satisfactorily as the original growths.

From all these observations based on the application of the high-frequency treatment as used in some 38 papillary growths, it must be evident to the most sceptical that in this new method we have raised a mighty rival to the older suprapubic and to the transurethral operative cystoscopic methods. I believe that it will supplant previous methods, because of its far greater simplicity and its great effectiveness.

Technic and Dangers.—A. The method of employing the Oudin current for the removal of intravesical neoplasm is the same as described in the May 28, 1910, issue of the *Journal of the American Medical Association* and subsequently in the *Zentralblatt für Chirurgie*, No. 34, 1910. In the latter communication a mistake was made in stating that the spark gap in the muffler is approximately 25 cm. This should have read 0.25 cm.

The essential instruments for this therapy are: (1) a high-frequency machine with Oudin resonator,¹; (2) a ca-

¹To produce the current essential to the therapy discussed in this paper, I have used the high-frequency apparatus manufactured by the Wappler firm. The Oudin current is derived from the resonator, and is unipolar, thus allowing of the use of only one intravesical electrode. The current oscillates very rapidly and is of very high voltage. The source of the original current may be the usual street current. If this does not alternate the high-frequency machine must be fitted with an alternator. The accompanying sketch (Fig. 6) taken from de Keating Hart (1908) shows diagrammatically how the Oudin current is generated from the street current.

NOTE.—Instead of the induction coil and interrupter the latest model instrument uses a closed magnetic field transformer ("step-up") which

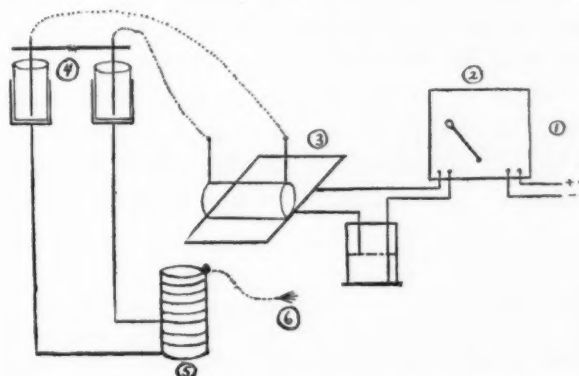
theterizing cystoscope; (3) a heavily insulated copper electrode.

After the bladder has been washed and then filled with distilled water, the cystoscope armed with the electrode is introduced. The electrode is pushed a short distance in amongst the villi and the current is allowed to play for 15-30 seconds at each application. The nearer the electrode ap-

gives more rapid oscillations and can be effectively employed in any room.

The Oudin current has been known for some fifteen years and has been used with varying success in a number of skin conditions. Of late it has been used in malignant disease by de Keating Hart. Almost all workers with this current have made use of a spark of varying length holding the electrode at some distance from the lesion and playing the sparks upon this. Early in my experimental work on skin warts, I saw that direct contact between the current and the electrode was much more

FIG. 6.



(1) represents source of current (street); (2) rheostat, meter, etc.; (3) induction coil and interrupter; (4) condenser and spark gap; (5) Oudin resonator and terminal; (6) electrode delivering the Oudin current.

effective in destroying the warts than when an air gap was maintained. The cauterizing effect of the current thus used can be easily demonstrated experimentally on a piece of raw meat immersed in water in a pus basin (non-insulated). The point of application of the electrode becomes rapidly white and in a few seconds the cauterization progresses to carbonization. While this takes place hydrogen is freely generated. A current of equal intensity applied through an air gap has no such effect. Moreover, according to the analyses made up to date, metallic copper appears to be regularly present in the tissues at some distance from the point of applica-

proaches the base of the growth the shorter should be the applications, lest the bladder wall be injured. Moreover if the electrode touches the bladder wall it causes pain, otherwise there is no pain. By making repeated applications at different spots the whole growth will be rapidly destroyed, and as it disintegrates it is voided in small pieces, as a rule. This process of separation in very large growths may extend over several months. As stated, I employed the Oudin current derived from a Wappler machine, usually placing the rheostat vertically, so that half the resistance was thrown into the circuit. If a stronger current seemed necessary I threw out the rheostat altogether. The spark gap in the muffler was made between one-eighth and one-quarter inches. Usually I employed a short gap.

As a rule, I employed the Nitze double catheter cystoscope. In one catheter tunnel I placed the electrode and to the other I attached a tube for irrigation. A direct cystoscope is useful in some cases, in others absolutely necessary.²

The electrode employed was a simple 6-ply copper wire thoroughly insulated and cut off squarely at the end. The end has to be pruned repeatedly as the rubber insulation melts during usage. This electrode I procured through the Wappler firm.

tion when contact is made but not otherwise. Investigations along these lines are not concluded as yet. Up to date it would appear that the current as used in the treatment outlined in this paper has several activities in addition to being a powerful cautery. It is only fair to say that physicists have rather regularly denied this.

In view of the ready handling of the Oudin current and in view of its marked cauterizing effects, it will surely prove of great therapeutic use in a great variety of conditions, not only in the bladder and urethra. In these parts it has proven an ideal cautery in my hands. The applications can be made under the guidance of the eye through cystoscope or urethroscope, and small or large areas can be cauterized as each case demands. In papillomatosis of the larynx I feel sure from experience in one extensive case, it will prove as useful as in the similar vesical condition.

²Of late I have used the Bransford-Lewis cystoscope, as it allows of direct and indirect vision applications at one sitting without withdrawing the instrument.

Applications.—The applications were made directly to the growth, the electrode being pushed a short distance in among the villi under the guidance of the eye, and then the current was turned on at various points for 15-30 seconds, the bladder being distended with distilled water. In my early seances I made the treatments rather short. The longest total applications that I have used at one seance aggregated 10 minutes, 30 seconds at 20 different spots. This was an enormous tumor and so long an application surely is not necessary except in such cases. A total of 3-5 minutes at one sitting will suffice usually. A few days later it should be repeated, provided any viable tumor tissue is visible, as at the original sitting it is impossible to determine how extensively one has destroyed the growth. Treatments are discontinued as soon as the whole growth appears necrotic. The sloughs are allowed to separate spontaneously or helped along with bladder irrigations. After the base is thus exposed (after 3 weeks or longer) it is treated as were the original outgrowths.

Effects.—The immediate visible effects are very striking. No spark is seen if the electrode is placed properly among the villi. A spark may be seen if the surface is flat and prevents the electrode from burying itself. While the current is on, gas³ is freely generated and bubbles out of the growth. If the point of application is superficial, one can readily see blanching of the tissues about the point of application, and at the spot where the electrode's point rested the tissues are blackened. As the electrode is withdrawn from the growth, very frequently it is found to be adherent to the villi, and as it is pulled upon, the whole tumor moves with the electrode which finally comes away with a small mass of tumor tissue baked to its tip. This is only rarely followed by bleeding, and a re-application of the current at the same spot usually controls this.

After the patient has expelled the necrotic tumor the base may require further brief applications to destroy any tumor

³ Outside of the body this gas produced in similar manner appears to be hydrogen.

residue as stated above. The patients should be carefully cystoscoped from time to time, and if any suspicious areas are visible they should be destroyed at the same sitting. In this way we can hope to obtain excellent and permanent results.

B. No method which is so destructive of tumor tissue can be absolutely free from danger. The patient that died some four days after treatment may have died of an embolus, and this possibility, I suppose, should be borne in mind, irrespective of whether death in this particular case was due to this cause or not. This is, however, a remote danger judging from all experiences with this method up to date.

Another danger that one can imagine is severe burning or perhaps perforation of the bladder wall. With care this should be avoided. As one is working under the guidance of the eye, one ought to know exactly where the electrode is situated before turning on the current and by adhering to this fundamental point no such damage should be inflicted.

History of the Method and Nomenclature.—In the early part of 1909, after purchasing in Vienna the intravesical set of operating instruments made by Victor Blum, for use through the ordinary Nitze catheterizing cystoscope, my thoughts were turned to procuring an intravesical cautery that could be used in the same manner as the Blum instruments. In Vienna I could find no such cautery, and on my return to America I decided to look into the question of using high-frequency current for this purpose, having previously had some experience with its cauterizing effects on skin warts. I immediately took the matter up with the Wappler firm, where I had bought my high-frequency apparatus, and was thoroughly disappointed when Mr. R. Wappler, the electrical expert of that firm, told me I could not use these currents as I wished, because, first of all, an air gap between the tumor and the electrode was essential, and, second, the current would burn out my cystoscopes. Others, whom I consulted, members of the profession who had more experience with these currents in dermatological conditions, told me that Mr. Wappler's views as to the necessity of having an air gap were absolutely cor-

rect. Despite this information I ordered through the Wappler firm a very thoroughly insulated copper (6-ply) electrode so that I might experiment with these currents and test the validity of these expert views. I wasted some time in trying to fit the end of the electrode with a cup-shaped depression which would retain a small amount of air even under water and thus give me a small air gap. In treating warts under water I quickly found that no such gap was essential and that the warts could be readily removed by direct application of the electrode and current to the warts. I then tested my cystoscopes (Nitze-type catheterizing-Loewenstein make) and found that they carried the current without in any way interfering with the illumination. I then treated skin warts through the cystoscope under water and obtained most satisfactory results. I was then ready to employ the method in bladder tumors as originally conceived.

In the meanwhile the over-zealousness and enthusiasm of a member of the firm, through which I obtained my original copper electrode, allowed him to unbosom the method to a number of colleagues in New York City. To how many he spoke I do not know. Several gentlemen informed me of this fact, which led me to make my preliminary report in May, 1910, whereas it had always been my intention not to write this subject up until I had observed the cases for at least six months after the disappearance of the growths. Fortunately the technic and the results mentioned in my preliminary report, based as they were on experimental work and clinical observations, were perfectly satisfactory, and subsequent experience has not led me to make any changes, so that in this more extensive paper I have nothing to retract from my original statements.

In proposing a new method of treatment it is always well to call it by some short name. As yet I have not been able to think of any name which properly characterizes this method of treatment, as the title of this paper shows. The high-frequency current of Oudin is used, applied through a copper (heavily insulated) electrode under water, and to express all

of that in one word seems more difficult than to cure a case by this method. Others (Keyes, Buerger, McCarthy) have spoken of the method as fulguration, to which I have repeatedly taken exception as the method is not the same as fulguration (de Keating-Hart, Pozzi). By fulguration is meant the method of using high-frequency currents as suggested by de Keating-Hart, "sideration" being the name originally employed by this experimenter. Pozzi suggested that it be called fulguration from the resemblance of the long spark to lightning. As de Keating-Hart says,⁴ "Let it suffice to recall that this method consists in an electrosurgical operation divided into two stages. The first stage consists of the operative removal of the tumor practiced if not extensively (when that is impossible) at least to the limit of the apparent boundaries of the disease, and including therein metastases and infected glands. Then, in the second stage, long and powerful sparkings of great frequency and high tension are applied to the wound thus made." Another striking difference is evident when we contemplate the effects of the current used as indicated above intravesically through water, and compare them with de Keating-Hart's observations. He says,⁵ "This method (fulguration) seems to act, not on the neoplasm, but on the soil in which it grows." "Mice cancers, when fulgurated, then removed, and reimplanted in healthy mice, developed afresh, under conditions identical with those of grafts that had not been exposed to the spark; the neoplastic cell (not destroyed directly by the electric discharge) was then in no way attacked by it as regarded its viability." On the other hand, in the intravesical method described in this paper, the growth is directly destroyed.

I believe these citations ought to make clear that the method here advanced should not be called fulguration. If the method is properly used one seldom sees sparking, and as fulguration refers definitely to the long lightning-like sparks employed in the manner described above by de Keating-Hart,

⁴ Interstate Medical Journal, June, 1910.

⁵ Ibidem.

and is an excellent descriptive term for a fixed procedure, it would be confusing to apply that term to the therapeutic method that I am here describing, and to call this new method of attacking intravesical neoplasms fulguration.

The current of Oudin has been used for some 15 years in removing surface growths, and the only novel feature of my method is the use of these currents under water and in the urinary bladder. The resemblance that it bears to the treatment of surface neoplasms is much greater than that which it bears to de Keating-Hart's technic, and it is my belief that for all these reasons it should not be confounded with the very recent development known technically as fulguration.

Therapy Used at Present in Bladder Tumors, Benign and Malign.—In this field during recent years there has been great discord, almost all surgeons favoring the transvesical route, a few pleading for the transperitoneal. Only two or three came out warmly for the transurethral route and the operating cystoscope. Of late a new school has come to the fore, saying "Hands off!" (Posner).

If we are face to face with a malignant neoplasm, there can be no question as to what procedure should be adopted. The transperitoneal operation recently strongly recommended by Dr. C. Mayo alone promises any result. If this cannot be done, owing to the patient's general condition, palliation and not a cure is the best that can be expected unless the tumor is very small. Under such conditions the Oudin current may produce a cure.

When, however, we come to the papillary growths, which probably are benign in the great majority of cases despite the fact that Rokitansky named them *carcinomata villosa* and despite the teaching of the Guyon school which considers them malignant because they recur so regularly after attempted transvesical excision, then we enter a much debated field. Nitze has shown that he can obtain much better results with the operating cystoscope than anybody has obtained by transvesical suprapubic operation, and he and Sonnenburg* only

*Bergmann, Bruns, and Mikulicz: *Handbuch d. Prakt. Chirurgie*, 1907.

recently declared that after such transvesical procedures recurrence is the rule. Cathelin in a recent paper admits at least 50 per cent. recurrences after the suprapubic operation.⁷ He sides with Nitze and the operating cystoscope. Whether the results by the transperitoneal route will approach those obtained by Nitze we cannot state as yet. Even if they should be vastly superior to those obtained by the suprapubic transvesical route, and just why they should be it is difficult to figure out, it must be evident that the danger of this operation is much greater than that of the Nitze procedure, and that the transurethral route is and will be the more ideal in every way. The only obstacle to the wide introduction of this technic has been the great difficulty of manipulating the rather complicated armamentarium and the very frequent sittings that some cases require as well as the occasional post-operative severe hemorrhages.

If, then, as it appears at present, the transurethral route gives the best results and is the least risky so far as immediate outcome is concerned, it is evident that the new method advocated in this paper must measure up with the method of Nitze and the operating cystoscope.

It is too early to say that the method used in the cases reported will give results as good as those reported by Nitze. It must, however, be evident that the technic here described is much simpler than that employed by Nitze, and it would appear from all the experiences gathered up to date that it will rival Nitze's method when end results are compared. The great simplicity of this new method, the rapidity with which large growths are destroyed, the ease with which any trained cystoscopist can carry out the necessary manipulations, all suggest to me that it is the method of the future in the treatment of benign growths in the urinary bladder.

⁷ Cathelin *Folia Urologica* No. 6, 1910.

APPROXIMATION OF THE ENDS OF FRAGMENTS IN FRACTURES WITH CONTRACTION OF THE ATTACHED MUSCLES.

BY P. B. MAGNUSON, M.D.,

OF CHICAGO.

MUCH attention has been called recently to the operative treatment of fractures. It has come to be looked upon with favor by able surgeons even in simple fractures of humerus and femur. As to the advisability of this, we will not discuss the subject here; it is simply to advance a method of handling the fractured bone so that the fragments may be placed in apposition with the least possible danger of infection.

While engaged in experimental work on lengthening shortened bones of the leg ¹ it was necessary to devise some method of stretching the soft tissues and at the same time holding the fragments steady enough to insert the ivory screws ² used in this operation. At that time we used hooks clamped into the ends of each fragment, the upper one being fastened to the upper end of the table by a wire, the lower one attached to a wire run over a pulley at the foot of the table to which weights were attached. This gave a strong, steady pull which rapidly stretched the soft tissues without injuring them. It kept the fragments in line and enabled the operator to manipulate the bone to his perfect satisfaction.

Adapting this method to use on old ununited fractures, where the ends of the fragments were far past each other, we found it most efficient and very simple.

A pad is placed in the axilla or groin as the case may be, and over this pad and encircling the limb is a broad piece of heavy ticking which is tied to the upper leg or end of the table. Another broad piece of ticking is placed flat above the knee or

¹ Lengthening Shortened Bones of the Leg by Operation, University of Pennsylvania Med. Bull., May, 1908.

² *Ibid.*

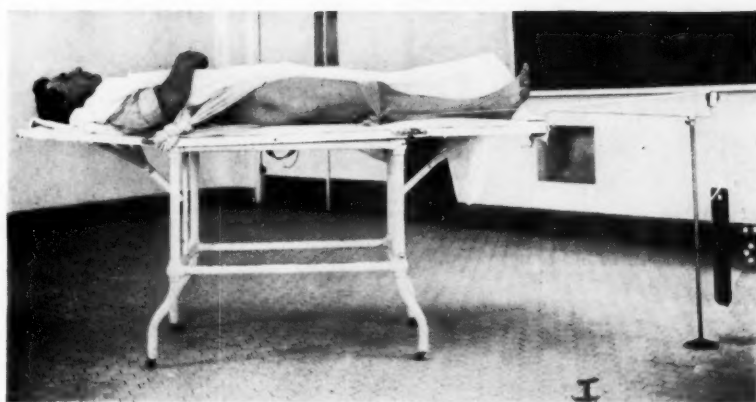
elbow-joint on the side opposite the large blood-vessels and brought around the limb, being tied in a clove-hitch on the opposite side. A wire is attached to the loop at the knot and this is run down to a pulley extended from the lower end of the table by an iron rod clamped to the table at one end and supported by a standard, which may be raised and lowered to suit requirements at the other. To the end of the wire we attached window weights—as many as are required (Fig. 1). In the operations on the femur we have used from fifty to seventy-five pounds, accomplishing the necessary stretching in from ten to twenty minutes.

ILLUSTRATIVE CASE.—Mr. F. H., aged forty-six. Occupation, switchman. Sustained fracture of left femur in November, 1910. He was an alcoholic, and his attending physician was unable to restrain him, with the result that the fragments had overlapped about three and one-half inches, and were buried in the muscles above and below, at an angle to one another. The patient was brought to Dr. S. C. Plummer for operation on March 12, 1911.

An incision was made in the thigh and the bony bridges cut away, the extension apparatus being applied when patient was placed on the operating table. As soon as the bony unions were cut the fragments drew into line, and inside of fifteen minutes the ends were in apposition without any muscular effort on the part of the surgeon. An assistant manipulated the lower leg at the direction of the operator, and the fragments were adjusted without touching the bone with the hands, which is such an important thing not to do in this sort of surgical procedure.

Dr. Edward Martin, of Philadelphia, has devised some very ingenious instruments for grasping and holding the ends of the fragments, if this becomes necessary. We have found the ticking loop to be very satisfactory, however, in most cases, and believe this acts with the least amount of traumatism to the parts, is simple and only stretches the soft parts immediately connected with the broken shaft, saving trauma to joints and ligaments above and below.

FIG. 1.



Showing method of stretching muscles of thigh.

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SIMPLE FRACTURE OF THE PISIFORM BONE.

BY R. B. DEANE, M.D., C.M. (McGILL),

OF CALGARY, ALBERTA, CANADA.

As simple fractures of the carpus, with the possible exception of the scaphoid, are of extreme rarity, the following case may be of some interest:

In February, 1911, the patient, a muscular young man, aged twenty-three, fell one story down an elevator shaft and in addition to some minor cuts and bruises on other parts of the body, believed he had sprained his right wrist, for which he consulted me within 15 minutes of the accident.

The pain in the joint was trifling and the appearance and movements of the wrist practically normal, but upon examination I was able to elicit crepitus over the pisiform bone and even to hear it at a distance of three feet when the patient rotated his forearm. This gave the patient the impression that there was something "loose," as he termed it, in the joint.

I skiagraphed the joint immediately, and the fracture was plainly visible in both supine and prone positions, even to slight stripping of the periosteum at distal end of fracture in the former position.

The fracture I presume to have been caused by sudden violent hyperextension of the wrist-joint with the hand adducted, the pull of the flexor carpi ulnaris being strong enough to cause a transverse fracture of the pisiform bone, the conditions reminding one of the part played by the quadriceps extensor in producing a transverse break of the patella with the knee flexed.

As one would expect from the slight separation of the pisiform fragments, the results as to treatment both in regard to function and appearance are perfect.

GERMICIDAL AND OSMOTIC ACTIONS OF PICRIC ACID.

BY O. W. H. MITCHELL, M.D.,

OF COLUMBIA, MISSOURI.

(From the Pathological Laboratory, University of Missouri.)

PICRIC acid has for a number of years been recognized as a very useful drug in the treatment of burns, particularly. Its use was based mainly on its power of coagulating albumins.

Recently Ehrenfried¹ has published his results regarding the germicidal action of aqueous picric acid solutions and the results obtained by the clinical application of the same. He used a saturated aqueous solution, which is 1.2 per cent. if the C. P. crystallized picric acid is dissolved in boiling water. His experiments showed this solution to be approximately fifty times more germicidal than 1 per cent phenol solution. The method used was to dip glass rods into a bouillon culture of recently isolated strains of *Staphylococcus aureus* and *Bacillus pyocyaneus*, allowing them to dry for one hour, exposing them to the action of the different germicidal solutions, washing off the excess of the solution in sterile bouillon, and then making agar streaks.

That these results might be confirmed, similar experiments were undertaken in this laboratory. For comparative germicidal action, solutions of bichloride of mercury were used and also the combined solutions of picric acid and bichloride.

The findings with the glass rod method are as follows: *B. pyocyaneus* was killed after a one and one-half minute exposure in the 0.5 per cent. aqueous picric acid solution and after a one minute exposure in a 1 per cent. aqueous picric acid solution. In the mercuric bichloride solutions no growth was obtained after a minute exposure. In the solutions containing picric acid and mercuric bichloride no growths were obtained after a half minute exposure.

¹ Journal A. M. A., vol. lvi, Feb., 1911.

B. typhosus was killed after an exposure of one and a half minutes in a 0.5 per cent aqueous picric acid solution and in one minute in a 1 per cent. aqueous picric acid solution. In 1:1000 mercuric bichloride solution no growth was obtained after a half minute and in a 1:2000 mercuric bichloride solution the organisms were killed in one minute.

Ehrenfried found *B. pyocyaneus* killed in from one to two minutes' exposure in a 1.2 per cent aqueous solution of picric acid, and the results obtained in this laboratory are confirmatory.

Such a method of testing the germicidal actions of solutions do not warrant the most reliable conclusions as to their clinical application.

Recently Seelig and Gould² described a very interesting method of testing the germicidal action of various solutions by osmosis through different tissues of living animals. Rabbits and guinea pigs were used for this purpose. The procedure is as follows: The animal is anæsthetized and the hair clipped from the skin of the abdomen. If the skin is to be used it is carefully dissected with sterile instruments, leaving it attached at one end. It is then stretched over a small container in which the solution to be tested is placed. A sterile glass rod clamped firmly and attached to a ring stand is lowered until it pushes the skin into the solution. As this is done a bouillon culture is poured into the depression around the rod and the time noted. Cultures are then made at regular intervals from the culture which was poured into the depression around the glass rod. This same procedure is used with all tissues, great care, however, must be taken when using the mesentery as small perforations are easily made. Another precaution is to, as nearly as possible, get the same amount of surface of the tissue used in contact with the solution in the container and also to use the same amount of culture around the glass rod. If these are not the same the amount of solution penetrating would be different in different experiments and the concentra-

² Surgery, Gynæcology and Obstetrics, vol. xii, March, 1911.

tion of the penetrating solution would vary with the amount of solution around the glass rod.

By this method the following results were obtained. No germicidal action was shown after sixty minutes' exposure when the skin and abdominal muscles were used. When the mesentery was used *B. typhosus* was killed in 15 minutes with a 1 per cent. picric acid solution, in 11 minutes with a 1 per cent. alcoholic solution, and in 15 minutes with 95 per cent. alcohol.

The bouillon culture with the aqueous and alcoholic solutions of picric acid became distinctly yellow in at least a minute when mesentery was used in the above experiments. The culture showed no picric acid coloration when the skin and abdominal muscles were used.

Seelig and Gould call attention to the rapidity of osmosis and the germicidal action of alcohol in a 95 per cent. solution. This undoubtedly accounts for the different results between the aqueous and alcoholic solutions of picric acid.

Through the kindness of Dr. F. G. Nifong, picric acid solutions have been employed for cleansing the skin of the abdomen of all his patients operated on at the Parker Memorial Hospital. The abdomen is shaved, washed with soap and water, and then the picric acid solution applied. This is done the night previous to the operation. Immediately before opening the abdomen, this same procedure is again practised. This procedure has been used in 19 cases. Smears are taken before the last application. In no case has a growth been obtained. At first aqueous solutions were used, but now a 1 per cent alcoholic solution is employed.

It was noted that after a prolonged operation the surgeon's fingers would be colored yellow, when they wore rubber gloves. It was found on experimentation that aqueous solutions will pass through rubber in from 30 minutes to several days, varying with the thickness of the rubber tissue employed.

In none of the cases have any untoward symptoms been noted. The urine of only one patient showed a transient albuminuria, and this cannot be ascribed to the absorption of the

picric acid solution employed any more than to the ether employed for anæsthesia.

Dr. A. W. Kampschmidt reports, personally, very favorable results from the application of a $\frac{1}{2}$ per cent. aqueous solution of picric acid in cases of chronic gonorrhœal urethritis.

CONCLUSIONS.

Picric acid is a strong germicide.

No untoward results occur from the application of a 1 per cent. aqueous or alcoholic solution to large areas of the skin.

Picric acid has strong osmotic powers.

In aqueous solutions it is capable of passing through rubber tissue.

The substance deserves closer study and a wider clinical application.

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Clinical Meeting, held at St. Luke's Hospital, April 12, 1911.

The President, DR. ELLSWORTH ELIOT, JR., in the Chair.

EXCISION OF THE RECTUM AND VAGINA FOR CANCER.

DR. ROBERT ABBE presented a woman, 40 years old, who came to him more than seven years ago with the rectum obstructed by a bleeding and foul-discharging adenocarcinoma, extending as far as the finger could reach, and bulging the adherent vaginal wall forward. An abdominal incision permitted exploration and drawing out the sigmoid, which was divided and both ends inverted. The distal end was dropped into the peritoneum, and the proximal end was drawn out through a second small, inter-muscular incision at the usual site of an inguinal colostomy.

Two weeks later, the rectum and posterior vaginal wall were removed by an incision completely through the perineum, extending around the anus and back to the sacrum. The coccyx was excised and the perineum again restored by suture continuous with the posterior wound. No more perfect sequel could be imagined: the patient had one normal movement daily from her side, and no compress excepting a flat handkerchief was needed, without other pressure than her clothing, to enable her to conduct her arduous house duties without discomfort.

The case was shown to illustrate a patient in perfect health seven years after extirpation of cancer of the rectum and vaginal wall, with admirable functional working of an inguinal anus.

ADENOCARCINOMA OF THE RECTUM: PERINEAL EXCISION.

DR. HENRY H. M. LYLE presented a man, 53 years old, who was admitted to the hospital on February 27, 1911. He gave a history of pain in the rectum for the past three months. This was most marked during and after defecation. He had had hemorrhoids for years, and of late these had increased in size and now protruded from the rectum. There had been more or

less constant bleeding during the past two weeks. He had recently been confined to bed, and had lost a good deal of flesh and strength.

Examination showed a fungating mass protruding from the anus. The mass extended upwards for a distance of two inches. A section, which was removed and examined microscopically, showed it to be an adenocarcinoma.

Operation, March 1, 1911: This consisted of a perineal resection of the anal portion of the rectum, with the formation of a gluteal anus. The wound healed by primary union. The patient has good rectal control.

DR. HOWARD LILIENTHAL said that in connection with these cases of artificial anus he desired to call attention to a paper which he published in the *ANNALS OF SURGERY* (September, 1910) in which he described a method which involved sewing the gut to the peritoneal and posterior rectus sheath, and then twisting it after the method of Gersuny and sewing it to the aponeurosis. He had followed this plan in a number of cases, and the resulting artificial anus was even watertight. Mayo had also tried it with good results.

ENORMOUS GOITRE, WITH GRAVES'S DISEASE: PERMANENT
HEALTH SIX YEARS AFTER CURE FOLLOWING
RADIUM TREATMENT.

DR. R. W. ABBE presented a woman who had suffered from exhausting symptoms of Graves's disease for a year and a half; to wit, palpitation, suffocation on lying down, tachycardia (pulse 120), trembling, progressive feebleness, anorexia and perspiration, enormous increase in the thyroid, with dyspnoea, inability to ascend stairs, and with moderate exophthalmus.

As the goitre was hopelessly inoperable, and as some claims had been put forth for the Röntgen ray treatment of goitre, as well as for operative work on the cervical sympathetic ganglia, Dr. Abbe conceived the idea of radiating the neck and goitre by inserting a strong radium tube into the goitre for twenty-four hours. No other treatment was adopted excepting occasional enemata and the use of Carlsbad salts.

The goitre began to subside in two weeks, and in eight weeks was so far reduced as to be nearly normal. The patient was soon restored to health, and during the following six months was able to walk many miles daily, to play tennis and resume her

usual occupations. She had remained in perfect health for six years, with no return of the goitre.

Dr. Abbe, in reply to a question as to whether he had employed the radium treatment in other cases of exophthalmic goitre, said he had treated many cases with this remedy; most of them had showed distinct improvement, and some were cured, as was this one. He had selected this case for presentation on account of the enormous size of the goitre.

RESECTION OF THE COLON FOR CANCER; LATERAL ANASTOMOSIS.

DR. R. W. ABBE showed four of these cases, and the specimen from a fifth (operated on the previous day). In all of these there had been an extirpation of an adenocarcinoma of the colon, with resection of the ileocaecal valve and from eight to eighteen inches of colon, followed always by lateral anastomosis. In all but one of these cases the adjacent lymph-glands were enlarged, and on removal showed only inflammatory hyperplasia. There were no recurrences. One patient was in perfect health two and a half years after operation.

SARCOMA OF THE PAROTID TREATED BY RADIUM.

DR. R. W. ABBE presented a man, who five years ago was on the point of giving up his profession as a lawyer owing to a parotid tumor the size of a goose egg cut lengthwise, which raised the ear and filled the parotid fossa. In order to illustrate the size of the growth, Dr. Abbe showed a colored plaster cast of the condition before and after treatment, which consisted of the insertion into the tumor of tubes of radium. Its rapid reduction and diminished size had been sustained by occasional treatments at long intervals, with the result that there remained now an inert mass.

Portions of the tumor had been punched out prior to the insertion of the radium tubes, and had been reported to show all the qualities of parotid sarcoma excepting cartilage.

Dr. Abbe said he had demonstrated the specific action of radium against parotid sarcoma in numerous other cases.

LARGE PRIMARY CARCINOMA OF THE LIVER.

DR. ABBE showed this rare case. The patient was a man with an abdominal growth of four years' duration, with associated lumbar and hypochondriac pain, which had obliged him to

give up his work two years ago. Dr. Abbe made an exploratory incision and found a massive, lobulated tumor of the entire left lobe of the liver, so that its size was much greater than that of the normal right half. The right half of the liver was pushed well into the right hypochondrium, but it was absolutely normal in color, and uninvolved. The left lobe was composed of a conglomerate series of masses of different shades of tawny brown—none as dark as liver. A piece was excised for examination and submitted to Dr. Wood, who pronounced it a true, primary adenocarcinoma of the liver. A fair estimate of the weight of the growth would be between four and five pounds. The surface was left exposed in the wound, and packed down upon with sterile gauze.

After a few days radium treatment was begun as follows, in the hope that the growth might be affected, as many other hypertrophic adenomatous structures were, by it: Eight long celluloid tubes of pencil size were thrust far into the tumor in different directions. Into two of these tubes strong radium in glass was inserted (100 mg. of pure French radium, strength 2,000,000x). Every six hours one of the empty tubes ("dummies," as Dr. Abbe called them), was removed and replaced by a radium one, and thus the mass was equally radiumized for about 40 hours. The wound was then allowed to granulate, and soon healed.

Following this the patient was greatly improved and returned to work. He had continued in good health and had worked for the past two years, excepting for one interval of a month when he returned to the hospital for a second treatment to try and further reduce the mass, which had, on the whole, not materially changed in total bulk, excepting in the central area for a hand's breadth, where it had shrunk so as to make a saucer-shaped concavity.

In this case, Dr. Abbe said, the radium treatment seemed to have arrested the growth and restored the patient to working health.

INOPERABLE LARGE CAVERNOUS ANGIOMA OF THE PAROTID REGION TREATED WITH RADIUM.

DR. R. W. ABBE presented a young girl who came under his care for an apparent soft cyst of the parotid region, about the size of half an orange, and quite deforming. An operation revealed

a purple angioma with a thin capsule, over which branches of the facial nerve were traced. Extreme hemorrhage followed any attempt to enter the mass, while ignipuncture seemed likely to imperil the facial nerve.

An incision was made into the mass, with instant blocking by a tube containing 60 mg. of pure radium bromide. This was surrounded by packing and left in the centre of the angioma for one day. The wound was then allowed to heal, and the patient went home. There was a sharp radium reaction four weeks later, about the usual time, but of great severity. There was induration, heat and tenderness, with malaise, chills and a temperature of 106.5° , which for three days gave rise to some anxiety. Then the mass began to shrink, and she gradually made an excellent recovery, with restoration of the side of the face to its present perfect appearance.

The pathological change in this case, Dr. Abbe said, was a cellular one rather than a thrombophlebitis, as there was no extension to the neighboring veins. The toxic febrile record occurred not infrequently in extensive radiumization, as in mammary or other glandular treatments, and the speaker said he attributed it to be the result of some liberated chemical products, due to tissue changes, which was short of absolute necrosis, but which was invariably followed by atrophy and fibroid changes favorable to cure.

EXTREME HYPERTROPHY OF THE LEFT HALF OF THE TONGUE TREATED WITH RADIUM.

DR. R. W. ABBE presented a young man of 25 who since he was thirteen years of age had had an increasing growth of the left half of the tongue with more or less constant pain and attacks of bleeding. The involved portion of the tongue had grown to be three times its normal size, and presented a papillary growth of its surface as well as the deeper tissues, due to angiomatous and lymphoid hyperplasia. The normal midline of the tongue was pushed far to the opposite side, and the overtopping growth was purple and glazed in appearance, with clots and a tough secretion of offensive odor. The pain had caused him to give up his work. His speech was very thick and swallowing was difficult. There was occasional severe hemorrhage.

The case seemed to be a typical one of hypertrophic glossitis, with excessive angioma and lymphangiectasis, in which good

might be expected to follow radiumization. He was given a few short applications of a plaque coated with twenty-five milligrams of pure French radium, and covered by a rubber dam for protection, which was no barrier to the penetrating electrons of radium. This treatment produced a rapid effect. Two weeks of discomfort followed, after which the process began to retrograde, and now, a year later, the condition was more than half cured, with every promise of complete recovery by slow, patient and occasional treatment. No other surgical expedient could possibly have accomplished such admirable work.

Dr. Abbe, in concluding his series of cases treated with radium, said he had only exhibited a very few of the intensely interesting effects of radium in unusual surgical conditions, and had purposely omitted showing any of the ordinary cases of superficial basal-cell epithelioma which invariably yielded to radium, and of which he had cured hundreds.

There was one other type of round-celled sarcoma which he had expected to show, but the patient was unable to come. The case had been already reported in print, and up to the present time had remained perfectly cured of a rather large sarcoma of the lower eyelid, seven years after treatment with radium. Remarkable as it might seem, one could not tell to-day by appearance on which eye the tumor grew, so perfect was the restoration of every tissue. A series of colored plaster casts of this case was shown, illustrating the stages of treatment before, during, and after radium cure, extending over a period of only eight weeks. The growth had existed one year, and had failed to respond to Röntgen ray or other treatment.

EPITHELIOMA OF THE BLADDER.

DR. CHARLES L. GIBSON presented a man, 71 years old, who was admitted to St. Luke's Hospital on February 20, 1907, suffering from marked hæmaturia. Cystoscopic examination showed a small growth situated just above the left ureter. Under ether anæsthesia the growth was removed by suprapubic cystotomy, including the underlying mucous membrane. The bladder was closed by inversion of the opening, with tube drainage, according to the method recommended some years ago by Dr. Gibson. Convalescence was uneventful. All leakage had ceased at the end of a week, and the patient returned home in two weeks, entirely cured, and without wearing any kind of dressing. Since

the operation he had remained absolutely free from urinary and other symptoms, and might be considered cured. Microscopic examination of the growth showed it to be an epithelioma.

OLD POTT'S FRACTURE; OSTEOTOMY AND BONE PLATES.

DR. CHARLES L. GIBSON presented a man, 28 years old, a machinist by occupation. A year ago he injured his right foot, sustaining a Pott's fracture. The result of treatment left the foot in a disabled condition, with backward displacement, eversion and abduction, causing practically total disability.

Under ether anæsthesia, an osteotomy of the fibula at the site of the fracture was done, as well as an osteotomy of the internal malleolus. Following these the foot could be brought back into satisfactory position. The section of the malleolus was maintained in proper position by a three-hole Lane plate. Healing of the wound was satisfactory and at the end of a month the foot was in good position. At the present time, however, since the patient had been walking about and using his foot, some recurrence of the deformity was apparently taking place. There was some abduction and the result was not perfectly satisfactory.

FRACTURE OF THE FOREARM TREATED WITH LANE PLATES.

DR. GIBSON showed a boy, thirteen years old, who was admitted to St. Luke's Hospital on October 27, 1910. A week previously he had sustained a fracture of both bones of the right forearm at the midpoint. Under ether anæsthesia an incision was made over the fracture line in each bone, and a four-hole Lane plate applied. Healing was satisfactory, and the patient left the hospital in two weeks. He now had a perfect result: the arm was straight, there was no deformity, and functionally it was as good as before the injury, including complete pronation and supination.

MIKULICZ RUBBER DAM DRAIN.

DR. GIBSON showed a boy convalescing from an operation for appendicitis in order to illustrate the use of rubber dam drainage. He had now used this device for about twelve years in cases where he had occasion to insert a large tampon, particularly in the abdomen. It was his custom to make the outer layer of the tampon of the rubber dam used by dentists. This could be easily sterilized, and in its centre a few holes were cut. The method

employed was to introduce the rubber dam at the bottom of the cavity, maintain it in position, and put in as much gauze for drainage as seemed needful. The gauze drained well, capillarity sucking up the fluids through the holes cut in the rubber tissue. The removal of the gauze could be done without disturbing the rubber dam, thereby securing the patient's comfort, and diminishing largely the inconvenience and danger of the adhesions of the gauze to the adominal contents. By this method one could do all necessary dressing, renewing the gauze, in some cases, without giving the patient any pain or discomfort.

AMPUTATION AT THE KNEE FOR OSTEOSARCOMA.

DR. GIBSON presented a married woman, 25 years old, with the following history: She was admitted to St. Luke's Hospital in December, 1909, complaining of a swelling in the middle of the left leg. There was the history of a blow six years ago, and the swelling was first noticed four years before her admission.

An X-ray was taken, which showed a moderate enlargement of the tibia at its mid-point. In the centre of this swelling was a cavity the size of a twenty-five-cent piece, resembling a focus of osteomyelitis. At operation, after uncovering the cavity, some pultaceous material was evacuated. The surrounding bone, however, showed no signs of necrosis. The pathological report was not final, the condition being regarded either as an osteosarcoma or a productive osteitis. The wound healed well, but the patient soon had a return of the pain and re-entered the hospital in February, 1900.

Another X-ray picture taken at this time showed a process somewhat similar to the first one, but larger. Believing that he was dealing with a malignant growth, the tibia, for a space of two and a half inches, was resected, including the periosteum. It was expected eventually to complete the operation by some form of bone plastic, but as the patient was pregnant at the time, it was deferred indefinitely. She obtained only temporary relief from the operation, and returned in December, 1910, showing some enlargement at the site of the operation, attended with pain, spontaneous and on pressure.

The X-ray showed a certain amount of bony production at the site of the old operation, and a rather dubious appearance which might be interpreted as a recurrence of the growth. The patient's pain increased, requiring considerable morphine, and it was felt

that the time had come to institute more radical measures. On March 21 disarticulation was performed at the knee. The wound healed and the patient was relieved of all pain.

Macroscopical examination: The specimen consisted of the left leg, amputated at the knee-joint. On the anterior aspect, about 25 cm. below the joint, there was an annular scar about 2×4 cm. Just external to this there was an incision 18 cm. long, which disclosed a tumor of the tibia, forming an oval mass about 5×6 cm. This was covered by fibrous tissue which had been split open to expose the structure of the new growth. This was made up of bony material, but in the form of granules or calcified material instead of a solid mass. Below and external, and on a level with the lower border of this mass was a second oval growth 2×1.5 cm., apparently within a tendon. It was as hard as bone.

Microscopical examination: Sections showed rather loose calcareous tissue made up of ill-defined cells, some of which, however, showed distinctly staining, fair-sized oval nuclei.

EMERGENCY PROSTATECTOMY.

DR. GIBSON presented a man, 91 years old, who was admitted to St. Luke's Hospital on November 13, 1905. He had been an inmate of an institution for the blind for some years. When admitted to the hospital he was suffering from extravasation of urine, due to forced and unsuccessful attempts to pass instruments for the relief of retention, the result of prostatic hypertrophy. On account of the false passages, no instruments could be passed into the bladder.

Under ether anæsthesia a perineal section, without a guide, was performed, evacuating much blood and urine from the infiltrated perineal tissues. Having in mind the patient's helplessness on account of his blindness, it was thought wise to attempt the risk of relieving the condition, so a prostatectomy was undertaken. Owing to the friability of the infiltrated tissues, the prostate as a whole was speedily delivered, although unintentionally. Notwithstanding the patient's advanced years and his feeble condition, he made a good recovery, and was discharged entirely healed in two and a half months. He now enjoyed good health for a man of his advanced years. He had imperfect control of his urine, which was to be expected after the removal of the prostate *en masse*.

URETERAL CALCULUS: EXTRAPERITONEAL REMOVAL.

DR. LYLE showed a boy, thirteen years old, who since he was four years of age had suffered from recurrent attacks of pain in the right flank. The pain came on gradually; it did not radiate, reaching its maximum intensity in five or six hours and then gradually subsiding. The patient had vomited once or twice during severe attacks. Recently the attacks had become more frequent and severe and of longer duration. The urine had been cloudy at times; there was no history of blood in the urine. Four years ago, at another hospital, a diagnosis of acute appendicitis was made and the appendix was removed, but the patient's symptoms persisted.

Upon examination it was found that the lower pole of the right kidney was palpable. There were no areas of hyperaesthesia; no tenderness nor rigidity. An X-ray plate showed a shadow in the course of the lower third of the right ureter.

An extraperitoneal exposure of the right ureter was made by means of a semilunar incision, which corresponded to a prolongation of the right limb of a Pfannenstiel incision. The ureter was lifted into the wound by means of a blunt hook, and a vertical incision was made over the calculus. This proved to be a mulberry-like stone about the size of a bean, of a mottled brown and white color. This portion of the ureter was dilated to the size of the forefinger, and the stone could be pushed up and down for a distance of an inch and a half, but no further. The stone was extracted by forceps, and the ureteral wound was closed by a continuous gut suture. The abdominal wound was closed by layer suture, with a small rubber drain inserted at the lower angle. The patient made an uninterrupted recovery.

OPERATION FOR CARCINOMA OF THE CERVIX; NO RECURRENCE AFTER NINE YEARS.

DR. H. M. LYLE presented a woman, 48 years old, who had been operated on nine years ago for an adenocarcinoma of the cervix. A complete hysterectomy, with removal of the adjacent glands, had been done. There were no evidences of recurrence up to the present time.

PERFORATING DUODENAL ULCER.

DR. HENRY H. M. LYLE presented a man, 32 years old, who was admitted to St. Luke's Hospital on February 18, 1911. His

family history was negative, and he gave no previous history of stomach or intestinal trouble.

On admission he stated that for the past three days he had suffered from diarrhoea, which had kept him from work. On the fourth day he returned to work and ate a hearty lunch. Three hours prior to admission he was seized with a violent, cramp-like pain in the epigastrium; he felt faint, and vomited a small amount of clear fluid. There was no history of a chill. His temperature on admission was 101.4° ; pulse, 108. An examination of the blood showed 16,700 white cells, with 90 per cent. of polymorphonuclears. The urine was negative. He did not appear to be very sick and complained of very little pain. The abdomen was contracted, rigid, and moderately tender, the tenderness being most pronounced above McBurney's point.

The case was regarded as one of acute appendicitis, with spreading peritonitis, or possibly a subacute gastric ulcer. A vertical incision was made at the outer border of the right rectus, and upon opening the peritoneum, a thin, seropurulent fluid gushed out. The appendix was found to be normal. A second incision was then made over the region of the stomach, and upon incising the peritoneum, the same seropurulent fluid was encountered. The stomach was normal. On the upper, posterior aspect of the duodenum, about three-quarters of an inch distal to the pylorus, a pin-point perforation was found. This had apparently been temporarily sealed by the liver, which showed a fresh, fibrinous patch. There were no adhesions, and no induration about the ulcer. The perforation was closed with a purse-string suture, and the suture line reinforced by tacking a portion of the gastrohepatic omentum over it. Both abdominal wounds were closed without drainage. The patient made an uninterrupted recovery.

Dr. Lyle said that he believed this to be a true, acute ulcer of the duodenum, as there was no history of any previous stomach trouble, and there was an absence of adhesions and induration.

LINITIS PLASTICA OF THE STOMACH (BRINTON) (CIRRHOSIS OF THE STOMACH): GASTROJEJUNOSTOMY.

DR. LYLE presented a woman, 40 years old, who was admitted to St. Luke's Hospital, in the service of Dr. Theodore C. Janeway, on June 11, 1907, and transferred to the surgical side on July 23 following. The patient's father had kidney trouble

and rheumatism, and three of his children had rheumatism, two with cardiac complications.

The patient had her first attack of rheumatism when she was nineteen years old, which kept her in bed one month. Seven years later she had a second attack, with cardiac complications, of eight months' duration. She had a third attack two years later, and her last attack had occurred in January, 1907. This was followed by otitis media, which lasted four weeks. She had frequent attacks of nocturnal dyspnoea, which compelled her to sit up in bed to breathe, and she suffered from pain, palpitation, dizziness and syncope. Her menses were irregular and painful. There was no history of syphilis.

Five days prior to admission the patient had sharp, cramp-like pains in the left lumbar and inguinal regions, radiating downward and inward into the thigh. These pains persisted for three days; then they disappeared, to reappear on the second day after. She felt nauseated, but did not vomit. The attacks came on at irregular intervals and seemed to bear no relation to the taking of food. She complained of tenderness at a point just to the left of the umbilicus.

A stomach analysis, made on June 4, 1907, gave a total acidity of 56; free hydrochloric acid, 20; no lactic acid; no Boas-Oppler bacilli; no blood. A blood examination showed 11,532 leucocytes; polynuclears, 74 per cent.; lymphocytes, 26 per cent.; hæmoglobin, 70 per cent. Urine normal.

As the patient still complained of severe attacks of pain in the epigastric region, and as her condition was steadily growing worse, she was transferred to the surgical side for operation, the diagnosis being gastric adhesions. When Dr. Lyle opened the abdomen on July 27, 1907, a mass of adhesions was encountered, and the exact relationship of the parts could not be made out. On separating the adhesions, it was found that the stomach was half rotated to the left, and the pylorus was firmly fixed by a short, dense band to the abdominal wall, an inch and a quarter to the left of the umbilicus. There was a corresponding twist in the great omentum. The stomach itself was about half the size of the fist, puckered and scarred. Over the region of the pylorus and lesser curvature the wall was markedly thickened and congested, suggesting a possible old ulcer or a new growth. A section of tissue was removed for examination. The adjacent glands were enlarged. It was decided to shorten

the gastrohepatic ligament to prevent the recurrence of the rotation, and to do a gastro-enterostomy, but during the shortening of the ligament the patient's condition became serious, so the gastro-enterostomy was abandoned and the abdomen closed. She made an uninterrupted recovery, and left the hospital on the fifteenth day, apparently cured of all her symptoms.

She was readmitted to the hospital on August 20, 1908, and stated that since her discharge she had been perfectly well so long as she limited the quantity of her food. The quality did not seem to make any difference. Five weeks ago she began to vomit about half an hour after eating. The ingestion of food began to cause considerable pain, which was referred to the site of the old scar. The pain was sharp and cramp-like in character, and radiated down the left leg to the knee. It was gradually becoming worse, and was very severe at the present time. There was some burning in the throat, and eructations of gas. She had lost 25 pounds in weight in eight months, and had grown quite weak. There were occasional attacks of dizziness; no symptoms of loss of cardiac compensation. The stomach contents showed a slight increase of total acidity, and free hydrochloric acid on the first examination; the second, a loss of acidity and free hydrochloric acid. The abdomen was soft, concave and relaxed, and there was some tenderness in the epigastric region. No mass could be made out. The stomach could not be outlined: six ounces of water distended the organ and gave considerable distress.

A diagnosis was made of possible gastric adhesions, and with the previous history in view it was thought advisable to place the patient under medical treatment for gastric ulcer before proceeding to operation. The patient was thereupon put on Lennhartz's regimen, but without benefit.

Operation, September 9, 1908, by Dr. Lyle: On opening the abdominal cavity a small, shrunken and scarred stomach was found; it was covered with adhesions, some of them dense, others thin, extending from the anterior surface of the abdominal wall and from the lesser curvature to the under surface of the liver. The lesser curvature was represented by a dense, scar-like mass, radiating from which were folds of thickened tissue and adhesions. The distance from the pylorus to the œsophageal opening, measured along what remained of the lesser curvature, was less

than one-half inch. The stomach was contracted to about the size of a goose egg, and was almost circular in shape. The stomach wall seemed to be twice the normal thickness.

A no-loop posterior gastrojejunostomy was performed. Considerable difficulty was experienced, due to the smallness of the stomach and the thickness of its walls. The patient made a prompt and rapid recovery, and was out of bed on the thirteenth day. Since leaving the hospital she has remained under careful observation, and is well and strong. She has gained 35 pounds in weight, and has worked steadily. The stomach contents still show a diminished acidity.

At the first operation, Dr. Lyle said, the true condition was not recognized, and it was thought to be a case of ulcer of the stomach with the formation of numerous perigastric adhesions, accompanied by accidental rotation of the stomach. The walls of the stomach at that time were thickened and scarred. The freeing of the adhesions and shortening of the gastrohepatic ligament gave relief for almost a year. At the second operation the uniformly increased thickness of the walls and the marked diminution of the size of the stomach, plus the scarring, showed that we had to deal with something else than a contraction following a simple ulcer. In the causation of this condition we had a combination of two factors, each of which had been given as the cause of the disease: We had a well-marked history of chronic, passive hyperæmia from cardiac insufficiency, the result of repeated attacks of rheumatism, and a strong possibility of multiple peptic ulcers. The chronic condition, plus the irritation set up by the ulcers, would undoubtedly be a sufficient stimulus to start changes in the connective-tissue elements of the stomach, and thus lead to marked general contraction; with the contraction would come of necessity a thickening of the walls until we would find a rigid organ with greatly diminished lumen and thickened walls.

Dr. Lyle said that since the preparation of this report the patient had had four distinct attacks of toxic erythema, due to the taking of meat. These attacks could be controlled by the addition of some dilute hydrochloric acid and pepsin, showing that her stomach digestion was below par for the digestion of meats.

The microscopical examination of the tissue removed showed

a marked increase in young connective-tissue cells in all layers with areas of chronic inflammation, nothing pointing to malignancy.

DR. GEORGE WOOLSEY said that less than two years ago he operated on a man who had been treated on the medical side of the hospital for an ulcer of the stomach, with stenosis. Upon operation the stomach, although not as small as in the case described by Dr. Lyle, was found to be so much diminished in size and its walls so thickened that an ordinary suture operation could not be done, and the Murphy button, which was used instead, did not reach through the stomach wall. The man made a good recovery. A month or two ago Dr. Woolsey said he heard that the man had died of carcinoma, with metastasis in the brain, after a year of good health. The patient was still a young man, 34 at the time of operation. The speaker said he had also seen this condition of thickening and contraction in the rectum and lower sigmoid.

DR. CHARLES N. DOWD asked whether this contracture had been observed in other parts of the alimentary tract? He recalled a case reported by Dr. Welch, of Baltimore, at one of the meetings of the American Medical Association, where a somewhat similar contracture of a part of the intestinal walls had so puckered the intestine as to cause occlusion.

DR. LYLE said that similar thickenings had been reported as occurring in the rectum, colon, and cæcum, where they had probably been regarded as cancerous in nature. Dr. Woolsey's case probably belonged to that class. Cases had also been reported where the duodenum was involved as well as the ileum. In some of these cases they had found a low grade of epithelial tissue.

Dr. Lyle said that he could only find three recorded cases in which the diagnosis had been made during life and later confirmed by autopsy—P. Boulton (1862), Deguy (1896), Osler (1901).

MESENTERIC CYST; RESECTION OF ILEUM.

DR. HENRY H. M. LYLE presented a woman, 40 years old, who was admitted to the hospital on August 27, 1910. The patient's family history, as well as her past history, was negative. For a year prior to her admission she had had several

attacks of pain in the lower abdomen, accompanied by vomiting, distention and abdominal tenderness. These attacks would last a few days, and then clear up, only to recur in the course of two or three weeks, and the interval between the attacks was gradually growing shorter. Since her last attack there had been persistent tenderness in the left iliac region. Her chief complaint was recorded as recurrent attacks of pain in the pelvis, with irregular menstruation.

Examination of the abdomen showed some tenderness in both lower quadrants, most marked on the left side. On bimanual examination, a large, cystic mass was found in the left fornix; this appeared to extend up and backwards into the pelvis, and the relation between it and the uterus could not be determined. The mass could also be felt per rectum.

Operation, October 1, 1910: With the patient in the Trendelenburg position, a median incision four inches long was made. On opening the abdomen a mass of congested omentum and adherent coils were found. Upon separating the adhesions a thin-walled cyst about the size of the fist was found between the leaves of the mesentery of the small intestine. The left leaf of the mesentery was detached, and the cyst enucleated up to the gut. At this point the cyst was found to be so adherent to the gut that five inches of the ileum had to be resected. The ends were united by an end-to-end suture, the wound was closed without drainage, and the patient made an uninterrupted recovery.

The specimen was examined by Dr. Francis C. Wood, who reported as follows: A thin-walled cyst filled with gelatinous material. The interior of the cyst was multilocular. The wall of the cyst was composed of connective tissue, without visible lining membrane. Outside was a very loose mesh of fibrin infiltrated with polynuclear leucocytes.

CHOLELITHIASIS: STONE IN THE COMMON DUCT.

DR. WALTON MARTIN presented a woman, 72 years old, who had been admitted to St. Luke's Hospital with the diagnosis of carcinoma of the stomach. She complained of vomiting, pain in the epigastrium, and loss of flesh and strength. She was markedly jaundiced. The jaundice, however, from time to time became less pronounced, and the pains were more severe and

paroxysmal than was usual in carcinoma, nor was any mass to be felt. The diagnosis of stone in the common bile duct was therefore made.

Upon operation a medium-sized, freely movable stone was found in the common duct, and was removed. The patient made a good recovery from the operation, although she still had attacks of vomiting.

FOREIGN BODIES IN THE PLEURA; CHRONIC EMPYEMA.

DR. MARTIN presented a man, 33 years old, who had had a sinus in the chest for the past four years. At that time he was operated on for empyema, which had followed a pneumonia. For three months the drainage continued; then the sinus closed for a few weeks and again burst open. Since then the sinus had been almost constantly open and discharging pus.

Under ether anæsthesia the sinus was excised and two ribs removed. There was a moderate-sized cavity at the upper and posterior part of the pleura, and the hand passed into the pleural cavity came in contact with a foreign body, which on removal proved to be a drainage tube. Further exploration showed a second tube imbedded in granulations. The two tubes were removed.

After the operation the pleural cavity was irrigated daily, and at the end of two weeks the discharge had almost ceased. The sinus was then filled with Mosetig mixture (oil of sesame and spermaceti, of each 40 Gm.; iodoform, 60 Gm.). Six days later the sinus was closed. The patient had rapidly regained his strength and now weighed over 200 pounds.

FOREIGN BODY IN THE PLEURA; CHRONIC EMPYEMA.

DR. MARTIN presented a man, 38 years old, who gave a history of a chronic empyema with a discharging sinus for the past seven years. He had been going from dispensatory to dispensatory to have his wound dressed. From time to time and in certain positions he coughed up a considerable amount of purulent sputum.

Fifteen days ago, under ether anæsthesia, the old sinus was excised, and portions of the second, third, fourth, fifth, sixth and seventh ribs, together with the thickened pleura, were removed. Upon passing the hand into the cavity a small drainage tube was found near the apex of the lung and was removed. The tube was

very foul-smelling, and had evidently been in the pleural cavity for a long time.

A small strip of pulmonary pleura was then excised, and the patient allowed to come out of the ether. Coughing was induced, causing the lung to expand. The wound was then closed and a large drainage tube introduced. For the first few days the stench from his wound was almost unbearable. This had now disappeared and the patient was gaining in weight and strength.

ECTOPIC GESTATION; LITHOPEDION.

DR. MARTIN presented a woman, 39 years old, who was admitted to the hospital complaining of pelvic pain. Upon vaginal examination a hard mass could be felt in the posterior cul-de-sac. A part of the mass had a sharp, projecting ridge and felt like a foreign body. X-ray examination showed an indistinct shadow low down in the pelvis. The patient was a widow, whose husband had been dead four and a half years. During the last year of his life she believed herself to be pregnant, and at the fourth month she took measures to terminate the condition by introducing a stylet and injecting kerosene into the uterus. This was followed by a moderate hemorrhage. Since then she had had attacks of pelvic pain from time to time, but had been able to do her housework. About two months ago the pain became more severe.

Under ether anæsthesia a median laparotomy was done. The uterus was normal in size, and on the right side, adherent to it, was a hard mass the size of an orange. It was composed of an adenomatous mass and the skeleton of a foetus, apparently of the fourth month. The foetus was curled about the adenomatous mass. The left ovary was cystic.

The mass, together with the cystic ovary and the body of the uterus, was removed. The patient made a good recovery. The projecting edge felt on examination was the humerus of the foetus, and on re-examining the X-ray picture, its shadow could be indistinctly seen. The foetus had apparently been in the abdominal cavity for four years.

DR. LILIENTHAL said that in order to illustrate the importance of using the X-rays in tumors of the abdomen, he wished to report the case of a woman who first came under his observation on January 26, 1911. She was apparently suffering from appendicitis, but as she said she was seven months pregnant, and the

fetal heart sounds could be heard, it was decided to postpone operation. When he saw her again, two months later, the uterus had apparently regained its normal size, although she had not been confined, and on each side of the abdomen there was a mass which was supposed to be a fibroid. She had apparently recovered from her attack of appendicitis. The fetal heart sounds could no longer be heard, and the fetal movements had ceased. The woman said she had visited a gynæcologist, who was quite positive that she had not been pregnant.

Dr. Lilienthal had an X-ray taken by Dr. Leopold Jaches, which showed distinctly the fetal head in the right iliac region. The child's ribs and spine could also be made out. Upon operation he found a six or seven months' child lying free in the abdominal cavity, its only attachment being a few small omental adhesions. The membranes had practically rotted away. The placenta was attached to the left ovary; there was no fluid. The entire specimen was removed in one piece and the patient made an excellent recovery.

Dr. Lilienthal said that so far as he knew, this was the first case on record in this country where the diagnosis of intra-abdominal pregnancy was verified by the X-ray.

MESENTERIC THROMBOSIS; OPERATION; RECOVERY.

DR. WALTON MARTIN presented for Dr. W. SCOTT SCHLEY a man, 42 years old, who was admitted to the First Surgical Division of St. Luke's Hospital on December 23, 1910, having been transferred from the Medical Division and the service of Dr. Theodore C. Janeway.

He had been taken sick twenty-four hours before entrance and several hours after a meal, with a sudden "sharp pain" across the upper abdomen. The pain was continuous from the onset and frequently radiated to the lower abdomen in a stab-like manner. He vomited once, two hours after the beginning of the attack. Vomitus contained no blood. Bowels moved normally morning before attack, but not afterwards, nor had he passed flatus. Urination normal prior to attack. No history of stomach, intestinal, rectal or urinary disturbances before attack. No venereal history could be obtained or history of abdominal trauma. He had had lobar pneumonia four years before, and but for that has worked for many years at his trade and says he has always been a strong healthy man, taking only an occasional glass of beer.

His temperature on admission was $100\frac{3}{8}$; pulse 94 and respiration 24; leucocyte count, 20,000, with a polynuclear percentage of 89.

Examination showed only a moderately distended abdomen with general rigidity. Tenderness to pressure was not marked and seemed somewhat greater over the upper half. Probably some fluid accumulation. The man had the appearance of suffering, and the action of one acutely ill, but as yet in good condition. No definite diagnosis could be made, but abdominal section was clearly indicated.

Operation (Dr. Schley): Ether anæsthesia. On opening the peritoneum in median line below the umbilicus about 200 c.c. of dark red, fairly clear serum escaped. It had no fecal odor. The intestines were moderately distended and showed slight general vascular engorgement. Just below the lower end of the incision, a deep, black-red loop of gut presented. It was found to be part of a good-sized coil in the same condition. The gut was thickened and indurated, and showed a sharp line of demarcation at either end from the healthy intestine. There was a very narrow, quite injected area between the two. The mesentery was a deep chocolate brown with gray black mottling, and was involved for from two to six inches from attachment to gut; the thrombosis affecting the terminal arches. It was much thickened and indurated and almost black on section.

Bleeding from the arteries could be demonstrated, but the veins were thrombosed. The gut was excised four inches on either side of the involved area and the mesentery well beyond demarked lines and to where both vessels bled. The affected gut, nearly two feet in length, was later found to be filled with brownish, bloody fluid and detritus. There was no ulceration of the mucosa apparent to the eye. A rapid examination of the contiguous gut revealed nothing. The ends were brought together in this case by button, reinforced by Cushing stitch and the mesentery by continuous catgut, care being taken in suturings to include no vessel of size. The peritoneum was flushed with hot saline and abdomen closed by layer suture.

The patient stood the operative work well, and on the third day following, gas and some fecal matter began to come away in the rectal saline irrigations. After wound healing appeared primary in every respect, a moderate temperature elevation was followed by an opening in the central part of the scar discharg-

ing some pus and fecal matter. The latter continued fairly profusely for ten days. The patient steadily gained, however, and the fistula contracted.

At his discharge on February 14, there remained a fine probe opening only, and dressings remained unsoiled for two or three days at a time. The button has not come away and radiographs show it still in the lower part of the ileum. The man is steadily gaining and further interference seems unwise at present. It is to be regretted that no cultures were taken from thrombosed veins before the specimen was put in preservative.

It is of interest in connection with this case to summarize briefly some of the collected autopsy records and reports of this condition.

So far the malady in the acute form has proven almost universally fatal, but delayed operations and faulty technic have undoubtedly been partly responsible. Some fifteen autopsy records, at least, show a comparatively small area of involvement with nothing apparent in the recorded findings to contraindicate resection. Some of these would probably have been saved.

In the collection of 214 cases of Mesenteric Embolism and Thrombosis by Jackson, Porter and Quinby, 47 were operated, with 92 per cent. mortality. They consider the cases of the disease may be divided into two groups: acute and chronic; acute, those of sudden onset and by far the larger number and in which death occurs in a few hours or days; the chronic, formed by the small number of cases having an insidious onset, sometimes remitting symptoms, those with no symptoms referable to the abdomen during life and those in whom spontaneous recovery resulted. In either group arterial or venous closure may be the cause. There were 14 cases, equally divided between arterial and venous occlusion, that ran a course of over two months. They were apparently due to a thrombosis with intermittent progression and the establishment of a competent collateral circulation in the meantime. Four cases were found in 1600 post mortems at the Johns Hopkins Hospital in which hemorrhagic infarction of the intestine had occurred without being suspected during life, collateral circulation having been established. Thrombosis of the larger mesenteric vessels and inferior cava has occurred without lethal termination. Brewer has recently reported a case of occlusion of the portal vein. On the other hand, in the acute cases, an inch of involved gut has proved fatal.

Very few cases were diagnosed during life and in the majority the condition was only disclosed at the post-mortem table.

The prompt recognition of a serious intra-abdominal condition in this case and the speedy transfer and operation were certainly very large factors in saving this man's life.

Stated Meeting Held April 26, 1911.

The President, DR. ELLSWORTH ELIOT, JR., in the Chair.

UNILATERAL WIRING OF FRACTURED RADIUS.

DR. WILLIAM C. LUSK presented a young man in the service of Dr. Keyes at St. Vincent's Hospital, who had a fracture of both bones of the forearm in their lower thirds. The ulna united, but union between the fragments of the radius was prevented by interposition of muscle.

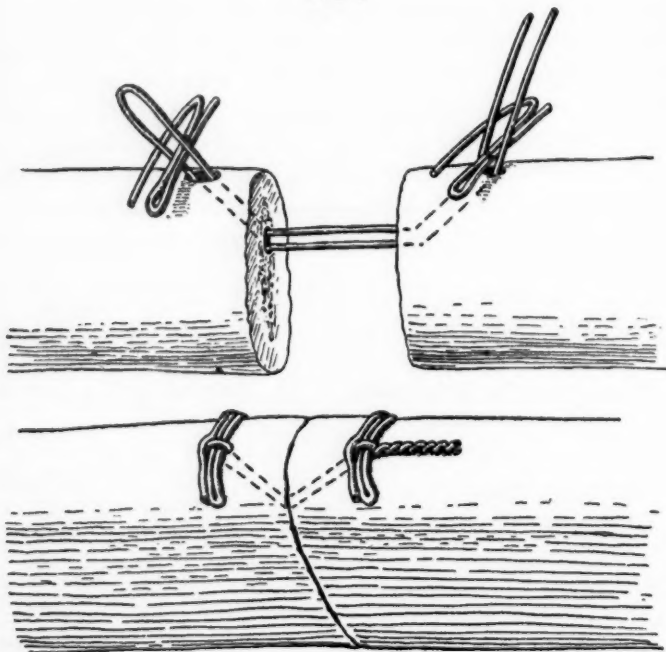
Operation, August 31, 1910, by Dr. Lusk: The preference for fixation of the fragments of the radius with wire was determined by the fact that an incision on the outer side of the forearm to reach the radius at the seat of the fracture must necessarily be of the gridiron type, access to the bone being gained here between the extensor ossis metacarpi pollicis and the extensor brevis pollicis, which pass obliquely across the radius and do not permit of wide retraction. About one-quarter inch was removed from the lower fragment, and a No. 22 silver wire inserted, as shown in the diagrams. It could be seen that when the cross-bar, made of a trifoldd piece of wire, had been caught within the looped end of the main wire passed through both borings, and the free ends of the main wire were then pulled upon so as to take up the slack, the fragments necessarily came together. The fixation cross wires were each folded three times, the double fold being passed beneath the loop of the main wire to anchor it, while the third fold passed outside the loop to clinch its hold. With its two extremities thus firmly fixed, the loop of wire held like a bolt.

The line of fracture was oblique from before backward, and in the result there was some anteroposterior overlapping, but the lateral margins were in perfect line, and the functional result left nothing to be desired.

In drilling bone, Dr. Lusk said, he always used a carpenter's

drill for drilling steel, fitted to a brace. In applying this form of fixation to the larger bones he would recommend the use of two of these wires placed a little apart.

FIG. 1.



Unilateral bone wiring. With its two extremities firmly fixed, the loop of wire holds like a bolt

SUPRACONDYLOID FRACTURE OF THE FEMUR.

DR. LUSK presented a boy, six years old, who had been in the service of Dr. Joseph D. Bryant at St. Vincent's Hospital. The original deformity consisted in an over-riding of the fragments, the upper projecting in front and internally.

Operation, February 22, 1911, three weeks after receipt of the injury: Through an internal incision from one-half to five-eighths of an inch of bone was removed from the upper fragment, which then had to be notched externally to fit a prong of bone projecting upward from the outer side of the lower fragment. Fixation by Lane splint. No other form of fixation could have held the fragments so easily or so well. The fracture was very close to the condyles, and the lower fragment could not be turned out through the wound. To have wired the fragments, an external incision would have been required as well, which must necessarily

have entered the synovial pouch of the knee-joint. In the lower fragment but just enough bone surface could be bared internally above the joint structures for the insertion of one screw, so that the only variety of Lane splint that could be used here was one with two screw holes above and one below.

Primary union followed the operation. The inner surfaces of the two fragments were held in the same plane by the Lane splint, but externally the prong of bone projecting upward from the lower fragment lay a little away from the direct line of the upper fragment, causing a slight lateral projection in the repair line. There was seven-eighths of an inch shortening, with good function.

COMPOUND COMPLICATED FRACTURE OF THE LEG TREATED WITH CHINOSOL.

DR. LUSK presented a man who was admitted to St. Vincent's Hospital, in the service of Dr. Keyes, on August 23, 1910. He was suffering from a compound fracture of the lower third of the right leg, and a deeply lacerated wound at the inner side of the right ankle, opening into the ankle-joint, the whole inner surface of the astragalus having been avulsed. There were no lacerations of tendons, and the arteries and nerves were intact.

The ankle-joint and the compound fracture of the leg were drained at once, and an irrigating tube was introduced into the ankle-joint and another just in front of the seat of the fracture of the tibia, and each of these was connected with a fountain syringe. The wounds were flushed with eight ounces of chinosol solution, 1:500, through each tube every thirty minutes for the first twenty-four hours, and then the interval was increased to one hour. On the third day the strength of the solution was diminished to 1:1000, and the interval increased to two hours. On the fourth day the irrigations were discontinued. The wounds were perfectly drained, and were subsequently cared for by simply changing the dressings, the sinuses never having been syringed again.

Dr. Lusk said the remarkable feature of this case was that on the fourteenth day union between the fragments of the tibia was so solid that not the slightest lateral motion could be elicited. There was a little spring at the seat of the fracture, and by traction on the foot the lower fragment of the tibia could be seen to descend about one-quarter of an inch. There was a shell of necrotic bone on the inner surface of the end of the upper fragment.

On December 31, 1910, the patient began walking about his room, using a cane only. In March, 1911, he was operated upon for sequestra. He has one and three-quarters inches shortening. With the use of an appropriate shoe he can now walk as far as half a mile at a time.

Dr. Lusk said that in the treatment of wounds with chinosol irrigations, pyocyaneus would frequently be found in the dressings, in the event of which occurring the addition of carbolic acid in a strength of 1:500 had been found effectual to prevent the growth of this bacterium.

DRAINAGE OF A SEPTIC KNEE-JOINT.

DR. LUSK presented a man, 49 years old, who was admitted in September, 1903, to Bellevue Hospital, in the service of Dr. Bryant, suffering from a pure streptococcus infection of the knee-joint. All the posterior recesses of the joint, *i.e.*, those behind both condyles of the femur and those behind both tuberosities of the tibia, were drained dependently. The drainage was effectual from the start, and the patient recovered with ability to flex his leg to an angle of about 80 degrees. Particular attention was called to a large synovial pouch situated between the external tuberosity of the tibia and the popliteus muscle, involvement of which had been found to be the cause for tenderness and swelling in this location in knee-joint suppuration. The skin incision for reaching this pouch was made along the front of the biceps tendon, curving a little backward, and the biceps tendon was dissected free anteriorly close to its insertion into the head of the fibula, until the bony notch between the styloid process of the fibula and the tuberosity of the tibia could be felt. From this notch, in a line upward and forward toward the tuberosity of the external condyle, which corresponded to the interval between the long external lateral ligament and the popliteus tendon, the incision was made through the capsule to enter this pouch. The site of this incision could be made prominent by passing a curved dressing forceps or a blunt scissors, curved on the flat, through an incision into the joint along the outer side of the patella backward and a little downward beneath the external lateral ligament, relaxed by flexion. The popliteus tendon was attached to the semilunar cartilage where it crossed the latter, so that the opening, which must be below the semilunar cartilage, could not be a very large one. If now a dressing forceps were pushed straight inward into this pouch, it met the resistance of a dense unyielding

attachment to the tibia which underlay the situation of the popliteal artery; but if, instead, the dressing forceps were passed inward and downward, in a direction corresponding to that of the groove where the head of the fibula met the tibia posteriorly, then the instrument could be pushed through the soft parts, and, breaking through the fascia covering the popliteus muscle, would find its way to beneath the skin at a situation a little behind the semitendinosus tendon. The bottom of the pouch behind the external condyle was reached through an anterior incision lateral to the patella, with a scissors curved on the flat, passed straight backward, hugging the tuberosity of the external condyle, the knee being flexed. To reach the bottom of the pouch behind the internal condyle the scissors must be passed backward and upward. To open the pouches behind the condyles without preliminary introduction of an instrument inside through anterior incisions, it was easiest, after exposing the capsule, to cut it in a direction from behind forward directly on to the condyle. The external popliteal nerve on the outer side must be kept in mind.

A narrow pouch, about one inch in depth, between the internal tuberosity of the tibia and the semimembranosus tendon was opened in this case by cutting loose the attachment of the internal semilunar cartilage to the tibia at this situation. The necessity for draining this pouch generally would seem doubtful. The subquadriceps bursa was drained, and tubes were passed beneath the lateral ligaments. The pouches behind the condyles and that behind the internal tuberosity were fitted with irrigating tubes with an eye cut near the end of each, which came out through the dressings and were connected together with V-shaped glass tubes until they all communicated with one reservoir, through which intermittent flushings were carried out. The knee was maintained in a position of a few degrees of flexion. On the eighth day silkworm gut strands were substituted for the tubes.

At the present time, Dr. Lusk said, he drained the subquadriceps bursa at its dependent portion, just above the external condyle, which lay immediately in front of the aponeurosis of the vastus externus near its attachment to the femur; he used an abundance of silkworm gut strands for drainage material that must be carried beneath the lateral ligaments, and he preferred this material to tubes, which were very painful in this situation and provocative of ulceration. In his last case of knee-joint

drainage, which was one in which the posterior pouches were not opened, he made transverse incisions on either side of the tip of the patella instead of longitudinal ones along this bone, which were equally effective in controlling the suppuration and did not leave ugly scars to fix the patella on either side. He did not recommend draining the posterior pouches in suppurative arthritis of the knee unless their involvement was suspected or evident. The liability of involvement of the pouch between the semimembranosus and the inner head of the gastrocnemius in knee-joint suppuration was likewise to be borne in mind.

OPERATIVE TREATMENT OF FRACTURE OF THE FEMUR.

DR. JOHN B. WALKER presented a man, 43 years old, who was struck on the right thigh by a large brick. An hour later a side splint was applied, and he was brought to the hospital in an ambulance. On the following day the splint was removed, and examination showed an oblique, spiral fracture through the middle third of the femur. There was 4.5 cm. shortening. A long side splint, with Buck's extension, was applied. At least fifteen pounds weight was used, which was increased to twenty within twelve hours.

Two days later a radiograph was taken, which showed accurately the obliqueness of the fracture, the over-riding and the angulation, together with several comminuted fragments. Hoping to reduce this over-riding by traction, the weight was increased to twenty-five pounds, which was all the patient could bear. Three days later a second radiograph was taken, which showed that only slight improvement had occurred.

Ten days after the accident, the patient accepted the necessity of an operation. A twelve-inch incision was made over the outer aspect of the right thigh, which gave a good exposure of the fragments. A small amount of callus was found, but practically no union existed. Two large, sharp-pointed fragments which were unattached and lay between the tissues were removed, and the ends of the bones were carefully freshened. Forcible traction was then exerted to reduce the over-riding of 3.5 cm., but this proved successful only when the muscles were detached for a considerable distance along the shaft of both the upper and lower fragments. The fragments were brought into alignment and finally secured by the application of a large sized Lane plate, about six inches long. Two screws were placed in the upper fragment, and two in the lower. Although the Lane plate held

the fragments in apposition and alignment, yet on account of the marked obliqueness of the fracture and because the plate was placed on the anterior surface of the fractured bone, it did not prevent backward bowing. A strand of silver wire was now placed around the lower end of the upper fragment and the upper end of the lower, and this produced a perfect result.

There was considerable bleeding during the operation, but this had largely ceased when the operation was completed, so that no drain was used. The muscles were not sutured, and the overlying fascia was united by fine chromic gut and the skin by silk. A plaster bandage was applied from the pelvis to the toes. Primary union followed, and on the fourteenth day the plaster was removed up to the ankle. Measurements then taken showed that the over-riding had been entirely overcome, and that both legs were of the same length. The radiograph showed perfect alignment.

On the twenty-eighth day the plaster was removed up to the knee, and the patient sat up in bed. Eight days later he began to go about on crutches, and on the fifty-sixth day the plaster was entirely removed and he began to walk with a cane. A week later he was able to dispense with all artificial support. There was considerable motion at the knee, which was steadily improving. Three months had elapsed since the operation, and there had been no complications on account of the presence of the plate. Without the operation, the shortening and angulation would have persisted, and he would have been permanently crippled.

Dr. Walker also presented a woman, 41 years old, who sustained a fracture of the right femur through its middle third. One hour after the fracture occurred it was reduced, and a plaster bandage was applied from the hip to and including the toes. The patient remained in bed; at the end of eight weeks a radiograph showed an oblique fracture, with some angulation, and over-riding of about 2.5 cm.; some callus but only slight union had occurred. Two weeks later (ten weeks after the accident), the patient came under Dr. Walker's care for operation. A ten-inch incision was made over the outer aspect of the thigh. The callus which had formed was removed, and the fragments, which were separated from each other, could not be brought into apposition or alignment even with the most forcible traction until the muscles had been freely detached from the shaft of the femur. It was necessary to use Lane's largest and most powerful forceps

to bring the fragments into accurate position. A large six-inch Lane steel plate was then applied, being secured by two screws to the upper and two screws to the lower fragment. No drain was used and the muscles were not sutured. The overlying fascia was united with fine chromic gut and the skin with silk. A plaster bandage was applied from the pelvis to and including the toes.

Primary union followed, and four weeks later a radiograph was taken which showed the plate and the fragments in perfect position. On the following day the plaster was removed, and gentle passive motion begun. Three weeks later another radiograph was taken, which showed that the plate had been loosened from its attachment to the upper fragment, and that some angulation had occurred. Dr. Walker said he believed this was due to the too early removal of the supporting case, and he desired to emphasize the necessity of allowing the case to remain for eight weeks, instead of four, as in this instance. This course had been followed in fourteen other cases following operation for fracture of the femur, without complication.

PYLORIC ADHESIONS FREED BY OPERATION.

DR. EDWARD M. FOOTE related the history of a woman, 35 years old, who was referred to him by Dr. Wm. Van V. Hayes, with a long-standing history of epigastric pain and symptoms of motor inability of the stomach. Upon operation, it was found that the pylorus was bound down to the liver and the posterior abdominal wall by close adhesions. These were divided, and the pylorus freed. Since the operation, which was done on October 28, 1910, the patient's symptoms of gastric trouble had entirely disappeared.

DR. LEWIS GREGORY COLE exhibited a series of X-ray plates of the case presented by Dr. Foote. These were taken before and after the operation, and illustrated, first, the deformity produced by the pyloric adhesions, and then the return of the normal gastric peristalsis of the stomach after the adhesions had been divided.

DR. ROBERT T. MORRIS presented a case similar to the one related by Dr. Foote. The patient was a man, 45 years old, without any history bearing on the present condition. He began to lose weight and had morning vomiting and hyperacidity. With bismuth solution in the stomach the fluoroscope showed interference with motility at the pylorus, due to adhesions at that

point. Upon operation they were divided, and Cargile membrane introduced to prevent their recurrence. Seven days later while all was going well the abdominal wound suddenly opened for a distance of four inches through the skin and superficial fascia. There was no evidence of sepsis.

The speaker said that he had a probable explanation for these cases of failure of union of the abdominal wound after stomach operations. He called attention to the areas of sensory disturbances, described by Head, and stated that we undoubtedly had neurotrophic disturbance accompanying sensory disturbance in the gastric zone of Head, the base of which lay in the midline between the navel and the ensiform cartilage. This was a probable explanation for the disproportionate number of cases of failure of union of superficial tissues, without sepsis, after gastric operations.

In this particular case the very slow repair of the wound while the patient was daily gaining in weight rapidly gave further evidence of neurotrophic disturbance corresponding to the area of sensory disturbance of the gastric zone of Head.

Also the pyloric adhesions which had developed without history of acute inflammation, Dr. Morris had described them frequently as cases of "cobwebs in the attic of the abdomen." They were very common, but seldom attracted attention unless they interfered with motility of the stomach or caused some reflex disturbance. These "cobwebs" are probably of toxic origin due to bacteria or toxins excreted by the liver and causing desquamation of endothelium in the vicinity. Plastic exudates following this toxic desquamation of endothelium form the "cobwebs in the attic."

Now that interference with motility of the stomach is being observed by diagnosticians with the fluoroscope, the diagnosis of a condition to which the speaker had been trying to attract attention for some years would be made frequently, and we would have a definite explanation for a certain proportion of our intractable dyspepsias.

CASES OF HERNIA WITH UNUSUAL FEATURES.

DR. A. V. MOSCHCOWITZ showed six cases, which he said all came under his observation during the past six weeks.

CASE I.—*Strangulated hernia in an infant five months old.* The history obtained in this case was that the baby cried a good

deal, and upon examination the mother noticed a swelling in the left groin.

When the child was brought to Mt. Sinai Hospital it was apparently perfectly well with the exception of the swelling in the groin, which was judged to be due to a strangulated hernia. At the operation the speaker found the sac of an inguinal hernia containing a tube and ovary. These were not strangulated by the neck of the sac, but were completely twisted and necrotic. The child made an uneventful recovery.

DR. WILLIAM A. DOWNES said he recently saw a very similar case in the service of Dr. Murray at the New York Hospital. The patient was a child, three months old, with a strangulated right inguinal hernia without any disturbance of the bowels. Upon operation, the hernial sac was found to contain a tube and ovary which were strangulated by torsion, two complete turns having taken place. The child made a perfectly good recovery. Dr. Downes exhibited the specimen which was removed.

DR. MOSCHCOWITZ said he had looked up the literature of so-called strangulated ovary and tube, and including the case just recorded by Dr. Downes, there were nineteen in all. In all of these there was never a strangulation of the hernia, but practically always a twist.

CASE II.—*Strangulated inguinoperforated hernia: undescended testis.* The patient was a man, 63 years old, who was admitted to the Har Moriah Hospital with the diagnosis of strangulated hernia. He gave a history of having had a hernia all his life, and he also knew that he had only one testicle. The hernia, of the size of an adult head, lay upon the abdomen and did not descend into the scrotum.

The patient was operated upon, and in the lower part of the hernial sac, in a large cavity completely shut off by itself, was a small, atrophied testis, located about opposite McBurney's point. Above this was a huge hernia, containing a large mass of omentum and small intestine. The patient made an uninterrupted recovery.

This was the first time, Dr. Moschcowitz said, that he had ever seen a complete tunica vaginalis in a case of undescended testis.

CASE III.—*Double inguinal hernia associated with tuberculous peritonitis.* This patient was a woman with a double inguinal hernia; both hernial sacs were studded with innumerable miliary tubercles.

CASE IV.—*Artificial hernia.* The patient was a young man who came to this country eight or nine years ago from Russia. After living in this country for a time he became homesick and went back to Russia, where he was notified to present himself for examination for service in the army. In order to avoid such service, his father took him to a certain address where he was laid flat on the floor with his hands under his head. Then a man sat on his head to keep him quiet, while a second man—not a physician—invaginated one of his fingers in the region of the external abdominal ring. This caused such excruciating pain that the young man fainted. He was then taken home and instructed to use snuff to make him sneeze and to drink freely of an infusion of yeast to make him vomit. He sneezed and vomited during the greater part of the night, and by the following morning a hernia had developed. When he presented himself for examination to the army surgeons they suspected that the hernia was artificial, and he was accepted. After three months' service he deserted and came to this country, and was operated on for his hernia in Brooklyn. This was followed by a recurrence. He now had a direct form of hernia.

CASE V.—*Sliding hernia of descending colon.* The patient was a young man who had a hernia, probably since birth—surely, since he was two years old. When Dr. Moschcowitz operated on him, two months ago, he found a huge sliding hernia, without a sac. In the course of this operation the intestine was accidentally injured, necessitating suture.

This operation was followed by a rapid recurrence, and upon reopening the abdomen it was found that not the sigmoid flexure, but the descending colon entered the hernia. This organ was pulled back into the abdomen, and fastened by sutures to the posterior parietes. It will be of interest to see whether or not a recurrence will take place after this operation.

CASE VI.—*Strangulated prevascular femoral hernia.* Dr. Moschcowitz showed a photograph of a case of strangulated prevascular femoral hernia. The operation in this case was done very recently, and the patient was still confined to bed.

HYPERTROPHIC ARTHRITIS OF THE HIP TREATED BY ALBEE'S OPERATION (ARTHRODESIS).

DR. WILLIAM DARRACH presented a woman, aged 29 years, who ten years ago jumped from a runaway carriage, wrenching her right hip. For a few days after this she was lame and

sore. Four months later, after exposure, she was in bed for sixteen weeks with what was said to be sciatica. When she was able to leave the bed her right hip was partially ankylosed in marked adduction, with some flexion, so that when she stood upright there was a difference of three and a half inches apparent shortening. During the next four months this gradually decreased until she was able to walk with a moderate limp. Eighteen months later, when she entered the Presbyterian Hospital, there was an inch of real shortening, with flexion to about 145 degrees. She was put up in Buck's extension for six weeks and then transferred to the Hospital for Ruptured and Crippled, where she remained for five weeks. At the end of that time she could walk with much greater ease, and three months later she returned to work. Four years later she tried osteopathic treatment for six months; during the first two months this increased her motion somewhat, but at the end of the time the movements were no freer than at the beginning, and the pain was a good deal worse.

She remained at work from October, 1903, until one year ago. During this time there was almost constant, dull, aching pain in the right hip, which was made worse by walking. In sitting at her work she had to keep her right leg under her chair in order to sit upright.

When the patient came to the Roosevelt Hospital, on March 14, 1910, there was still one inch actual shortening, flexion was limited to 145 degrees, abduction was restricted, as well as rotation. She had to use a cane most of the time. The X-ray showed a marked hypertrophic growth of the acetabular margin. The operation described by Albee was done on March 17, the only modification being the method of approach, the antero-external incision of Flint being used. The upper third of the head of the bone was removed, and the cartilage scraped from as much more of the articular surface as could be reached. The upper portion of the acetabulum was removed, making a flat surface for the cut surface of the femur to rest on. In order to overcome the adduction, the adductor longus had to be cut near its origin. The wound was closed without drainage, and a plaster spica applied from the costal margin to the ankle. This was allowed to remain for five weeks, when the stitches were removed and a new plaster applied to just above the knee. This was allowed to remain for nine weeks longer, and she was then permitted to go about on crutches, gradually using the leg more and more.

Since the operation, the patient had been absolutely free from pain in the hip, but for about six months there was pain over the cut adductor, with paræsthetic sensations over the region below the scar. She is now able to walk with a slight limp, there being firm ankylosis with marked compensatory movement in the lower lumbar and lumbosacral joints.

A careful pathological examination showed no evidence of any tuberculosis in the sections of bone removed.

TRAUMATIC ASPHYXIA.

DR. PARKER SYMS presented a man, 23 years old, who was admitted to the Lebanon Hospital on March 21, 1911. His previous history was negative, excepting that he had had one former attack similar to this one.

One hour before admission the patient suddenly became unconscious and fell, while operating a moving picture machine. The unconsciousness lasted for only a few moments. When the ambulance arrived he was conscious, but confused, and answered questions slowly. After his fall, the onlookers stated that his face became a dark blue color.

Upon his arrival at the hospital there was very deep cyanosis extending as far down as the level of the thyroid cartilage. There was a scalp wound and hæmatoma over the right parietal region, and an incised wound in the forehead, evidently due to the fall. There was bleeding from both ears, a large, subconjunctival hemorrhage in both eyes, and bleeding from both nostrils.

The hæmatoma was incised and the skull exposed without finding any external evidence of fracture, and there were no focal signs indicating an intracranial injury. While the hemorrhages noted above suggested a fracture of the base of the skull, the patient's rapid improvement dispelled that idea.

This man was reported to have had a similar attack five years before, which came on spontaneously. The speaker said he regarded the case as one of traumatic asphyxia due to epilepsy. Such cases had been reported. Usually, traumatic asphyxia had resulted from a severe compression of the thorax or abdomen in some crushing accident.

In the case presented, the man's cyanosis gradually disappeared, the subconjunctival hemorrhages were absorbed, and he left the hospital within a week, apparently perfectly well.

SUSPECTED TUMOR OF THE BRAIN: DECOMPRESSION
TREPHINING.

DR. SYMS presented a boy, four years old, who was admitted to the Lebanon Hospital on February 15, 1911, with the diagnosis of intracranial pressure. His chief complaint was progressing blindness. Until three weeks before admission he had been perfectly well. He then began to complain of headache, intermittent in character, which was his only symptom until one week before admission, when it was noticed for the first time that the child was unable to see. There were no muscular twitchings, no convulsions, no vomiting, no weakness, no disturbance of gait, no chills nor fever. Dr. William M. Leszynsky examined the patient and made a diagnosis of intracranial pressure, probably due to a tumor in a silent area of the brain.

In the left eye vision was greatly diminished, and in the right eye there was complete loss of sight. There was much swelling and œdema of both papillæ. In other words, there was increasing choked disk on both sides, that of the right eye being more marked than that of the left.

On February 20, 1911, Dr. Syms did a decompression operation by removing a section of bone about two inches in diameter from under the temporal fascia. The dura was pulsating and apparently normal. It was not opened, for experience had shown that sufficient expansion may take place without incising the dura.

The boy made an uneventful recovery. Improvement began very promptly, and long before he left the hospital he had practically normal vision in both eyes, and no symptoms which pointed to any permanent disorder.

DR. WILLIAM M. LESZYNSKY said that the diagnosis in this case, prior to operation, rested between an internal hydrocephalus and brain tumor. The choked disks and blindness were simply indicative of intracranial pressure and there were no focal symptoms: no headache, no vomiting, no vertigo. He thereupon advised a decompression operation, without opening the dura. This was done, as had been described by Dr. Syms, and the patient made a complete recovery so far as the vision was concerned.

The important point illustrated by this case was that where a decompression operation is indicated, it should be done at once, before more advanced and permanent disturbance of vision has taken place.

TORSION OF THE OMENTUM: SUPPURATIVE PANCREATITIS.

DR. SYMS showed the specimen in this case on account of the comparative rarity of the lesion. The patient was a man, 47 years old, who was admitted to the Lebanon Hospital on January 21, 1911. Twelve years ago he had been operated on for right inguinal hernia; this had recurred five years ago. Otherwise, his past history was negative.

Four days before admission, the patient's hernia became irreducible for a time, but it was finally reduced the day prior to his admission. He complained of severe pain in the right iliac region; this was lancinating in character and continued up to the time he came into the hospital. The patient's bowels had not moved for four days. He had no chills, no fever, no vomiting.

Examination showed a well-nourished, well-developed man. His abdomen was very much distended and was markedly tender, especially over the right side. Examination of his hernial region showed nothing excepting that there was no hernial protrusion. His temperature on admission was 100; pulse, 100; respirations, 28. A blood examination showed increased leucocytosis, with 90 per cent. of polymorphonuclears.

Operation: An incision was made through the right rectus muscle, exposing a large mass which proved to be a strangulated portion of omentum, due to torsion. The omentum was attached at its lower right corner; it had rotated high up, so that a large portion of the omentum was strangulated, although not quite gangrenous. It was filled with blood clots and dilated thrombotic veins. The omentum was twisted four times; that is, four complete turns were necessary before it was unwound. It was ligated above the point of torsion, and the strangulated portion was removed. Nothing else was discovered at the time of the operation, excepting a much distended bowel, which seemed to be due to an adhesion and kinking of the intestine.

On the morning following the operation, the patient presented increased signs of intestinal obstruction, and a colostomy was done near the region of the cæcum. This gave only partial relief, and on account of the increased distention and fecal vomiting, another enterostomy was performed, an opening being made in the loop of the small intestine. This relieved the signs of intestinal obstruction, but the toxæmia persisted. The cause of this could not be made out, in spite of various examinations. There were no evidences of a pancreatitis, although they were

looked for. Death occurred on February 8, 1911, two weeks after the first operation.

The autopsy showed that there had been no peritonitis and no infection due to the operation, but there was a suppurative pancreatitis. The pancreas presented the appearance of multiple small abscesses, with areas of fat necrosis. There was no fat necrosis outside of the pancreas. The gall-bladder was practically negative. No other lesions were found.

LARGE PROSTATE.

DR. SYMS showed a specimen removed from the body of a man, 77 years old, who was admitted to the Lebanon Hospital on January 5, 1911. He was practically well until three days before his admission to the hospital, with the exception of a very slight hæmaturia at occasional intervals during the past seven years. He gave no definite history of prostatic obstruction, and had never been catheterized in his life.

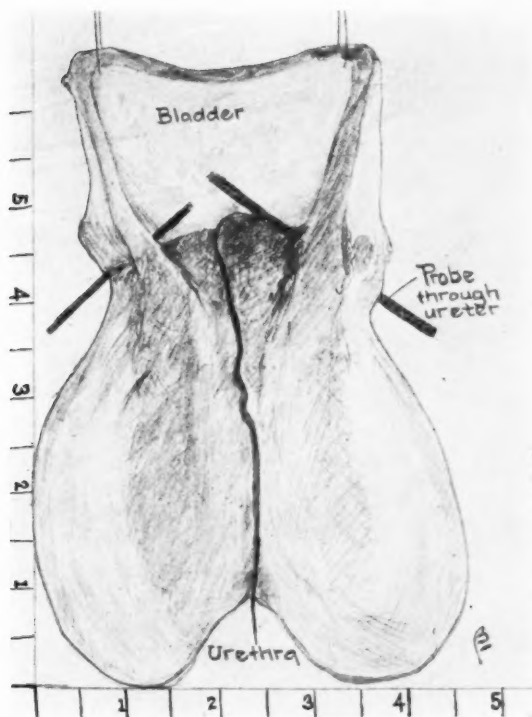
Three days prior to admission the patient noticed that he was passing bloody urine; this continued until the night before his admission, when he had an attack of complete retention, for which he was catheterized. A second attempt to catheterize him proved unsuccessful, and the patient was transferred from the medical to the surgical ward of the hospital, where Dr. Kakels did a suprapubic cystotomy under local anæsthesia. The bladder, which extended above the umbilicus, was full of blood clots. The prostate was immensely enlarged. The bladder was packed to stop the hemorrhage, but the patient gradually lost strength, and died twelve days after the operation. Death apparently resulted from feebleness due to old age, and was precipitated by hemorrhage. There was no infection following the operation.

At the autopsy, the pathologist removed the bladder, together with the enlarged prostate (Fig. 2). At the top of the latter was a granulating surface, but a careful examination failed to reveal any evidences of malignancy. It was simply a case of chronic inflammation of the prostate; in other words, a typical senile hypertrophy.

FRACTURE OF THE POSTERIOR CLINOID PROCESS OF THE SPHENOID BONE.

DR. SYMS presented a specimen obtained from the body of a lad, 19 years old, who was admitted to the Lebanon Hospital on March 20, 1911, and died within four hours from the time of his admission. A short time before he was brought to the hos-

FIG. 2.



Syms: large prostate.

100

pital he had been assaulted, being struck over the left parietal bone with a bottle. He was brought to the hospital in a state of deep coma, with stertorous breathing and evidences of pulmonary oedema, presenting the picture of a severe fracture of the base of the skull.

At autopsy the brain was found to be congested. There was a small clot in the fissure of Rolando, and it was found that the posterior clinoid process had been fractured completely from its base. There was no other fracture of the skull. Dr. Syms remarked upon the rarity of such an injury existing as an isolated lesion.

GANGRENOUS APPENDICITIS WITH TWO LARGE FECOLITHS IN THE APPENDIX.

DR. SYMS showed this specimen, which was removed from a young boy who was brought into the hospital within twenty-four hours of the beginning of a very severe attack of appendicitis. He was operated on without delay, the operation being done with the aid of the aspirating or suction apparatus which was described by Dr. Alexander B. Johnson at a meeting of this society on January 25, 1911. The appendix was found to be gangrenous and perforated near its base. The abdomen was filled with seropurulent fluid, and there had been an escape of some faeces. At the completion of the operation, which occupied about five minutes, the abdomen was drained, and the patient made a satisfactory recovery.

Two large calculi were found in the appendix, and it was interesting to note that these stones were more opaque to the X-rays than were the typical gall-stones. Possibly they might have been demonstrated *in situ*.

THE ASPIRATING CUP AS A TRACTOR.

DR. SYMS demonstrated this apparatus. He stated that a week ago he had occasion to enucleate a cyst of the thyroid, and he was able to do this through a small incision by using an aspirating cup as a tractor. After freeing the anterior and lateral portion of the cyst wall, the cup was placed over it and the cyst was at once sucked up into the cup out of the wound, and he then had only to deal with the base of the cyst, which was easily separated from the isthmus of the thyroid at its point of origin.

Dr. Syms thought that this method of utilizing this device, with proper modifications, might prove useful in many instances. Certainly all cysts could be remarkably well handled

thereby. It would be an excellent aid in grasping the gall-bladder if one wished to do a cholecystectomy without opening the gall-bladder, and it doubtless would be of assistance in grasping tumors, such as thyroid lobes, prostatic lobes, etc.

Dr. Syms said that since demonstrating this method his attention had been called to the fact that Fedor Krause had recommended the employment of the same device in grasping and delivering brain tumors.

GIANT-CELLED SARCOMA OF THE TIBIA: ENUCLEATION.

DR. L. W. HOTCHKISS presented a man, 23 years old, a truck driver by occupation, who four years ago first noticed a hard lump on the shin, above the inner malleolus of the tibia. Its development was slow and gradual; at first, pain was present only on walking, but lately this had become more pronounced and had caused considerable suffering after the patient was on his feet for any length of time. The pain was generally of a stabbing character, located in front of the ankle and radiating up the tibia and the calf of the leg. Recently it had practically incapacitated him from active, continuous work.

Examination showed an oval tumor on the inner surface of the tibia, extending from just above the malleolus upward for a distance of about four inches. It was about two inches thick at its widest portion, expanding the bone in all directions. (See X-ray pictures.) Its outline showed a conical-shaped tumor, with its base just above the articular cartilage of the tibia, and its truncated tip pointing about 4 inches above. It was bony, hard to the touch, tender, smooth, with a regular outline, and gave rise to no fluctuation or crackling on palpation. Extension, abduction and adduction of the foot were limited, and there was pain on passive motion. The patient walked with a limp, and the foot was held slightly inverted. At the level of the tumor the circumference of the right leg was 3 cm. greater than that of the left. The patient's temperature was 99.1; pulse, 96; respirations, 24. Urine, negative.

Operation, December 17, 1910: A long incision was made over the mass and deepened to the bone. The shell of bone covering the tumor was thin and easily removed, the posterior portion of the shaft being left in continuity. The tumor was enucleated with the finger, save for a small section of the growth which extended down into the base of the malleolus; this was broken off and removed separately. The large defect in the bone

FIG. 3.



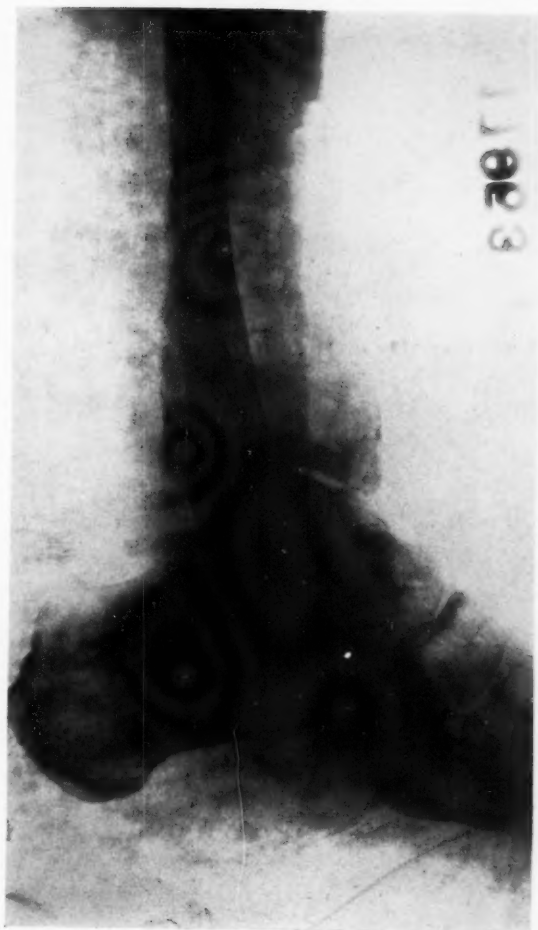
Sarcoma of lower end of tibia, viewed transversely.

FIG. 4.



Appearance of tibia after enucleation of diseased portion; anteroposterior view.

FIG. 5.



Appearance of tibia after enucleation of diseased portion, viewed transversely.

FIG. 6.



Sarcoma of lower end of tibia, anteroposterior view.

was almost entirely closed by deeply infolding the edges of the incised skin over the edges of the remaining bony shell, and holding them in place by a series of Lembert sutures. To aid in the retention of the skin flaps, a cigarette drain covered with rubber was placed in the long axis of the wound, and held in contact with the skin surface of the infolded flaps by the sutures. Primary union resulted.

At the present time, four months after the operation, the patient was going about without a cane and was able to bear some weight on the foot. The wound had remained healed, and there was no evidence of a local recurrence. The X-ray pictures showed the patient's condition before and after operation (Figs. 3, 4, 5, and 6.)

Upon gross inspection the tumor removed in this case was smooth, non-encapsulated, having the consistency of rubber, and mottled red, gray and white in color. Pathologically it was pronounced a giant-celled sarcoma. There were numerous cysts about 1 mm. in diameter scattered through the specimen and numerous giant-cells. The case was shown as an example of the propriety of excision instead of amputation in a giant-celled sarcoma of the extremity.

SUPPURATIVE CHOLECYSTITIS (PARATYPHOID): CHOLECYSTECTOMY: COLOSTOMY.

DR. L. W. HOTCHKISS presented a man, 50 years old, who was admitted to Bellevue Hospital on October 31, 1910. His family history was unimportant. The patient had been moderately alcoholic. He had smallpox seven years ago and gave a history of rheumatism. Denied typhoid or other fevers.

Three weeks prior to admission the patient began to suffer from diarrhœa following a chill. The diarrhœa became worse, until he was having about twenty movements a day, the movements being largely composed of slimy matter, and on the day before his admission blood was noticed in the stools for the first time. He gave a history of having had a somewhat similar attack three years ago.

A proctoscopic examination revealed extensive ulceration of the rectum and sigmoid, with small ulcers of the mucosa. No *amœba coli* were ever demonstrated in the discharges. The patient improved temporarily under treatment, but on November 17 he had an elevation of temperature, with a chill and pain over the liver. His symptoms continuing, he was transferred to the surgical division with a tentative diagnosis of liver abscess.

November 21, 1910, Dr. Hotchkiss opened the abdomen above the umbilicus through the right rectus. The gall-bladder, much distended and inflamed, at once presented and aspiration through its thickened wall revealed pus. A cholecystectomy was thereupon done in the usual manner, the cystic duct being ligated with cat-gut and a cigarette drain introduced to the stump. The abdominal wound was then closed. On account of the history of colitis, with ulcerations, it was thought best to do a colostomy for the purpose of washing out the gut. This operation was done through the usual gridiron incision, and a tube introduced into the cæcum.

Cultures which were made from the contents of the gall-bladder were reported by the pathologist, Dr. Chas. Norris, to be pure cultures of the paratyphoid organism. The lesion of the gall-bladder was a chronic, suppurative cholecystitis, with marked hemorrhagic infiltration of the walls of the gall-bladder, and almost complete destruction of the mucosa. A week later paratyphoid bacilli were demonstrated in the stools, apparently proving the connection between the intestinal and the gall-bladder lesions.

The abdominal wounds healed promptly, but the operative fistula was still maintained in the cæcum, and irrigations with argyrol solution were continued, although no paratyphoid organisms had been found in the stools since December 21, 1910. Any considerable interruption of the irrigations was liable to be followed by bloody stools.

Dr. Hotchkiss said this case was shown as an example of a paratyphoid carrier in which the gall-bladder as well as intestine were the foci of infection.

FRACTURE OF THE INTERNAL SEMILUNAR CARTILAGE.

DR. HOTCHKISS presented a man, 35 years old, who was admitted to Bellevue Hospital on February 18, 1911. He complained of pain and swelling of the left knee, with inability to bear his weight on the left leg. The history he gave was that on the day previous to his admission he had jumped from a moving freight train, landing with his left foot on a sleeper, the toes turning inward and at the same time twisting the knee sharply. With the assistance of several men he reached a stable, where he spent the night, and on the following morning he was brought to the city and admitted to the hospital.

The only point of interest in connection with his past history was that about eight years ago, while playing base-ball, he attempted to slide to base, and in doing so his left knee received a severe twist, which disabled him to such an extent that he was taken to a hospital in an ambulance, and was confined to bed two weeks with the leg strapped and bandaged. Since that time he thought the knee had always been more or less weak.

Upon the patient's admission to Bellevue, his left knee was found to be swollen and tender. Any motion gave rise to pain, and the tenderness was especially marked at the inner aspect of the knee along the head of the tibia and the inner border of the patella. An X-ray picture was taken, which gave negative results. A pressure dressing was applied, under which the swelling disappeared after a few days, but in view of the persistence of tenderness and the patient's previous history, a tentative diagnosis of rupture of the internal semilunar cartilage was made.

Operation, March 4, 1911: An incision was made along the inner edge of the patella, from the internal condyle of the femur to a point well over the head of the tibia. A curved incision was then continued backward along the tibial head, as proposed by Morrison, and the knee-joint was opened. A gush of blood-stained synovial fluid marked the opening of the joint, and a free exposure of the cartilage was obtained. There was evidence of an old fracture through the internal semilunar cartilage, and a small fragment of the articular cartilage of the internal condyle of the femur was gouged out and lay free in the cavity of the joint. The cavity was filled with a blood clot, showing that the detachment of the piece of articular cartilage was of recent date.

As much as possible of the internal semilunar cartilage was removed; the capsule of the joint was closed with catgut, and the skin with silk. A plaster case was applied and kept on for about three weeks. There was primary union, and the patient's convalescence was uneventful. After removal of the case the joint was treated with massage and hot air, and the patient was now walking about without crutches, and with a constantly increasing amount of flexion of the knee.

THE ANATOMY OF SPINAL PUNCTURE.

DR. WILLIAM C. LUSK read a paper with the above title for which see *ANNALS OF SURGERY* for October.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting held April 3, 1911.

PERFORATING ULCER OF THE SIGMOID FLEXURE OF THE COLON.

DR. GEORGE G. ROSS gave the history of a woman, thirty-five years of age, who was admitted to the Germantown Hospital in a condition of profound shock, with a rigid, tender, and distended abdomen. Symptoms had been developing but a few hours, patient having been awakened during the preceding night by pain in the lower abdomen and nausea.

An incision into the peritoneal cavity was made through the right rectus muscle. As soon as the peritoneum was incised, a gush of rather thick, yellowish fluid came forth, bringing with it lumps of hard fecal matter. There was marked redness over all peritoneal surfaces of the lower abdomen. At this point the etherizer gave notice that the patient's condition was critical. She was cyanosed, pulse uncountable, and respiration suddenly became irregular in both rate and rhythm. The operation was started under primary anæsthetic and had been under way for about five minutes. Ether had to be discontinued on account of the patient's condition. A glass drainage tube was inserted into the pelvis, and the wound closed with three through-and-through silkworm gut sutures. The patient was given an intravenous injection of normal salt solution while still on the operating table. She died about twelve hours later.

Immediately after she died, the stitches were cut, the tube removed, and a search made for perforation of the large intestine. This was considered as necessarily present, as the patient had solid fecal matter free in the peritoneal cavity. Eventually the perforation was found about the middle of the sigmoid flexure of the colon on the inner or the right side, about one inch from the mesosigmoid. The perforation was almost perfectly circular and large enough to admit the thumb of a medium sized hand up to the distal joint.

The entire colon from the ileocæcal valve to the site of the perforation was impacted with fecal matter of the consistency of

hard putty. There was no evidence of active tuberculosis, although there was one calcified mesenteric gland found.

CARCINOMA OF THE APPENDIX.

DR. GEORGE G. ROSS reported the history of a man, aged thirty-five years, who was operated upon for chronic appendicitis. When the appendix was exposed, it was found to be bound down by adhesions, and about its middle there was found a small mass about the size of a small pea and in appearance not unlike a caseous tubercle, bulging from the serous surface. Adjacent to the appendix, in the mesentery of the small intestine, there was found a mass of lymph-nodes, hard, densely adherent, about one inch in diameter, and about three inches in length. Smaller nodes were palpable in different localities of the peritoneum. The appendix was removed, the stump buried with a few linen sutures, and the abdomen closed in layers without drainage. A small amount of serous fluid was noted in the peritoneal cavity.

The stitches were removed on the sixth day. The incision healed nicely. The patient was discharged on the tenth day. One week later he was readmitted complaining of severe abdominal pain and diarrhoea. Examination revealed that the mass in his abdomen had increased rapidly in size, and that a mass in about a corresponding position under the left rectus was palpable. There was felt also a small mass in the abdominal wall, precisely under the left half of the umbilicus and extending to the left for about one inch. This mass was apparently about one inch in diameter. A section of it was removed for study. The abdomen on this admission was very tense and contained free fluid. Pain was very severe, requiring morphine.

Pathological Report on Appendix.—Dr. Bradbury reported as follows: Small nodule about two mm. in diameter, bulging from about the middle of appendix on serous surface. Microscopic examination revealed this to be a carcinoma simplex, not involving the mucous coat.

The nodule removed from abdominal wall was also reported to be a carcinoma simplex.

COMPOUND COMMINUTED FRACTURE OF THE FOREARM.

DR. GEORGE G. ROSS presented also a man who had sustained a compound comminuted fracture of both bones of the forearm, the result of an accident in a gymnasium. When seen by Dr. Ross two weeks after the accident, there was absolutely no union,

both bones were badly involved. After waiting another week in order to give the fragments time to harden up, he then cut down on the radius and wired it with heavy silver wire. Nothing at all was done to the ulna. In six weeks the patient was playing the pipe organ.

TUBERCULOUS ARTHRITIS OF THE ELBOW.

DR. ROSS presented a man, saying that he was operated on originally by Dr. Deaver, who took out a portion of the elbow-joint. Some time after that there were persisting sinuses, with extensive necrosis of the heads of the radius and ulna and end of the humerus. Dr. Ross resected the ends of all three bones, and interposed superficial fascia between them. Patient now has a very good joint; all ankylosis has disappeared.

POSTERIOR GASTROJEJUNOSTOMY DONE TWO YEARS AFTER OPERATION FOR PERFORATING GASTRIC ULCER.

DR. MORRIS BOOTH MILLER presented the man whose case was detailed by him at the meeting of February 1, 1909. Operation was done nine hours after perforation, and after a stormy convalescence there was apparently a perfect recovery. He was well for some weeks, but then commenced to develop gastric symptoms again, which, continuing, made it necessary last January to do a formal gastrojejunostomy. He illustrates the point which Dr. Deaver made at the meeting referred to, namely, that in these cases a gastrojejunostomy should have been done at the primary operation. However, Elliot has called attention to the fact that certain cases get well and stay well without that operation. This patient from the secondary operation made an easy recovery, and has had no subsequent trouble.

DR. HENRY R. WHARTON said that he thought that in the majority of cases the patients are in poor condition for any prolonged operation, and as to the fact that doing a gastro-enterostomy at this time does not always prevent a second perforation, he recalled a case of perforated gastric ulcer occurring in this city upon which Dr. Deaver operated and at the same time did a gastro-enterostomy; a year later the patient had a second perforation, which Dr. Wharton closed; a little over a year after the second perforation, the patient had a third perforation, for which he has recently been operated upon. As regards the question of doing a gastro-enterostomy at the time the perforation is closed, this is a matter upon which there is some

difference of opinion among surgeons; one of the first cases he operated upon for ruptured gastric ulcer, which was closed six hours after the perforation, has remained well up to the present time, simple closing of the perforation in this case being followed by a permanent cure.

With regard to the liability to second perforation, this is always a possibility. He operated about a month ago upon a case of perforated gastric ulcer, who at the time, about sixteen hours after the perforation, was in very desperate condition. He found the perforation, closed it, and the man did well for nineteen days, then he had a vomiting spell and a second perforation occurred which was closed twelve hours after the first symptoms. The patient only lived eight hours after this second operation.

DR. GEORGE G. ROSS reported the case of a man about fifty years of age who had a perforated duodenal ulcer, who was operated upon in an hour and a half after the onset of pain. In this case he would have certainly done a gastro-enterostomy had the patient's condition warranted, but by the time the perforation had been located and was closed the etherizer reported the man as about dead. He therefore did not think he was warranted in doing a gastro-enterostomy, but all his efforts were given to resuscitate the man, who finally recovered, and the wound was closed with pelvic drainage. A week later patient had a recurrence of symptoms, and from these he finally died. A postmortem showed an ulcer, horse-shoe shaped, an inch and a half long. The primary perforation which Dr. Ross had closed was in the stomach end and the second perforation was in the duodenal end. There were four other ulcers on the posterior wall of the duodenum. Had a posterior gastro-enterostomy been done the man's life might have been saved, but under the circumstances he did not feel warranted in prolonging the operation.

DR. JOHN H. JOPSON recalled the case previously reported by him before the Academy, of perforated pyloric ulcer, operated upon two years ago last November, it being one of five cases upon which he had operated. This patient entered the hospital just two years after the original operation for perforation, and he did a gastro-enterostomy for a recurrence of symptoms of ulcer and pyloric stenosis. Since then patient has remained well.

EVISCERATION THROUGH STAB WOUND IN ABDOMEN.

DR. MORRIS BOOTH MILLER reported the history of a man, aged twenty-five years, who was admitted to the Polyclinic Hos-

pital on October 8, 1909, soon after having received a stab wound of the abdomen. In the right lower quadrant was a clean-cut wound six inches or more in length, which extended through the entire parietes. It commenced about two inches above the anterior superior iliac spine, and went downward and inward toward a point midway between the umbilicus and the pubes. From it protruded enough coils of small intestine to more than fill the crown of a Derby hat. This mass had not only been contaminated by contact with the clothing, but it was also covered with intestinal contents exuding from coincidental perforations of the gut.

He was immediately taken to the operating room and etherized, his clothing was removed, and the character and extent of the wound was examined. Absolutely no attempt was made to cleanse the abdomen, as to have done so would have involved the replacement of the infected viscera within the abdomen. Instead of the usual scrubbing, the adjacent skin, including the edges of the wound, was covered with several layers of wet towels. The bleeding was traced to the deep circumflex iliac, a vessel in this patient of unusual size and capacity. It was controlled by ligature. There were three intestinal perforations, the largest of which was three-fourths of an inch long; two were about an inch apart, and the other some distance away. These were turned in and closed with Lembert sutures of silk. In addition there was a two-inch slash in the mesentery close to the intestinal border, which was also closed with silk. The toilet was completed by a very thorough and copious flushing with warm normal salt solution, care being taken to remove without insult to the peritoneum all unclean particles as far as possible. The mass of intestine was then returned to the abdomen, and the wound closed with tier sutures of catgut. Drainage was accomplished by the means of two split rubber tubes, one going through a median stab wound down to the rectovesical space, the other passing into the right flank, while close to these were placed two or three superficial wicks of gauze.

The patient was put in bed in the semisitting position of Fowler, and continuous enteroclysis was instituted. He reacted well, but during the night was restless and vomited a considerable quantity of semidigested food. During the night two coils of intestine again escaped outside of the abdomen. He was again etherized, placed in the Trendelenburg position and the loops of gut returned. This time the abdomen was closed with through-

and-through sutures of silkworm gut, suturing the peritoneum with a separate catgut stitch.

The subsequent history was uneventful. There was some infection in the superficial layers of the wound which delayed complete healing, but there was no general peritonitis and no localized peritoneal reaction of any moment. He was discharged cured on the thirtieth day.

STAB WOUND OF CHEST.

DR. MILLER related the history of a man, aged thirty-nine years, who was admitted to the Polyclinic Hospital on January 20, 1911, suffering from a stab wound of the left chest. He was not appreciably shocked, but complained of intense pain in the thorax; temperature was 98°, pulse 42, respirations 18. He stated that immediately after being wounded he had some difficulty in breathing, but this was not appreciable when first examined. Within an hour after admission he expectorated a small quantity of bloody mucus, and soon after there commenced a hacking, spasmodic cough which persisted more or less until his death, fifteen days later. Between the seventh and eighth ribs and just in front of the posterior axillary line there was a transverse knife wound about half an inch long; in this neighborhood there was an area three or four inches in diameter, which was slightly emphysematous. As the wound entered the thorax after passing through an unusually thick cushion of muscles, it seemed hardly likely that penetration had been very deep. However, the patient told us that he had been stabbed with a dirk having a six-inch blade, and he thought it went in up to the hilt.

Examination of the chest showed restricted movements on the left side, slight dulness on percussion over an area the size of the palm, many fine and coarse râles, but it was clear that no lung collapse or extensive intrathoracic hemorrhage had occurred. The breath sounds toward the base were unimpaired. The slow pulse was noted, and the question of heart injury was considered. The cardiac area of dulness was not increased, both the sounds were clear, and aside from somewhat labored action there was nothing abnormal discovered. Despite the history, which pointed to a deep wound, it was thought that only the superficial portions of the lung were involved. The chest was immobilized with adhesive plaster, and quieting doses of opium were administered.

For twenty-four hours his condition seemed satisfactory and he made no complaint except of the hacking cough. On the

twenty-second the temperature suddenly shot up to 104.8. Even with this fever there was no marked or, indeed, proportionate increase in the pulse or respiratory rates, the pulse being about 100 and respirations 24. Examination of the chest showed a widened area of dulness, five or six inches in diameter, over which distant bronchial breathing was heard. It was apparent that there was some pneumonic consolidation. Expectoration was profuse and rusty brown in color. Leucocytes numbered 16,300.

In long remissions which gradually decreased, his temperature fell to about normal on the twenty-ninth. By this time the external wound had completely healed and all the emphysema had disappeared, but the area of pulmonary dulness remained the same in size, and physical signs were unchanged. Expectoration was still free, but its brownish, blood-tinged character had entirely cleared up. The patient looked well, slept well, and made no complaint of pain or discomfort.

On February 1 he was transferred to the service of Dr. John B. Roberts, who has supplied the subsequent data. On that day his temperature rose in the afternoon to 103°, to fall to normal the next morning, and thereafter to run slightly subnormal until the end. For the first time he commenced to show signs of respiratory distress and wanted to sit up in bed. With a quickened respiratory rate the pulse remained relatively slow and gradually grew weaker. It was soon realized that his condition was rapidly becoming critical, but the explanation was not so clear.

The patient continued to grow worse and died early on the morning of February 4.

At autopsy the pericardium was found to be greatly distended and incision into it was followed by the escape of fluid under great tension, this fluid being cloudy, yellowish brown in color, purulent, containing a large amount of fibrin, and probably measuring from one to two litres in amount. The pericardium and epicardium were covered with a thick deposit made up of fibrin and detritus. It was impossible to determine the presence of a wound extending into the pericardium from the lung.

Examination of the left pleural cavity revealed a general adhesion of the parietal and visceral pleuræ everywhere, so that it was necessary to remove the pleuræ with the lung in exposing the latter. At the position of the external scar the course of the punctured wound could be followed through the chest wall, pleuræ, and lung to a point possibly about 3 cm. from the

external surface of the latter. Corresponding to the position of the punctured wound the pleuræ were separated from each other by an organized blood-clot, over an area of about 15 cm. in diameter and about 1.5 cm. to 2 cm. in thickness. There was no sign of suppuration to be found in the pleural cavity or the lung.

FRONTAL ENCEPHALOCELE.

DR. MILLER presented photographs (see Fig. 1) of a five-days' old baby who was referred to him from Dr. Hamill's clinic at the Polyclinic Hospital on March 15, 1911, suffering from frontal cephalocele. According to the nurse the mass had been the size of a small tomato at birth, and not unlike that vegetable in color and shape, but it quickly commenced to shrink and dry on its surface so that when seen it was a brownish, ulcerated, somewhat foetid mass $2 \times 1\frac{1}{2}$ inches in area with an elevation of about an inch. It was located over the glabella and spread broadly over the nose; while the eyes were partially covered by the mass they were not affected. The base was broad and appeared to be more on the left side, so that it was diagnosed as of the naso-orbital type in contradistinction to the nasofrontal or naso-ethmoidal forms of frontal cephalocele. There was no pulsation, no fluctuation, and no difference in size was noted when the child cried.

According to Von Bergmann, whose classification is now generally accepted, any congenital protrusion of intracerebral contents through a defect in the skull may be termed as cephalocele. The defects through which these protrusions take place are either frontal or occipital, except very rarely a defect between the sphenoid and ethmoid may give rise to one which appears in the pharynx. These defects are at or close to the median line, though the visible protrusion may be slightly to one side.

Frontal cephaloceles are divided as follows: nasofrontal, those in the region of the glabella; naso-orbital, those at the inner angle of the orbit; naso-ethmoidal, those below the nasal bones. Occipital cephaloceles are divided as follows: superior, where the defect is above the external occipital protuberance and where it may join the posterior fontanelle; inferior, where the defect is below the external occipital protuberance and where it may join the foramen magnum.

Cephaloceles occur in three forms, of which hydrencephalocele is the parent type, and encephalocele and meningocele represent retrograde changes from it. Hydrencephalocele consists of arach-

noid, a layer of brain tissue, and a cavity containing cerebrospinal fluid derived from the lateral ventricle with which it communicates. It is really a hernia of the lateral ventricle. Covering it are fascia and skin, the latter sometimes natural and sometimes so altered as to be scarcely recognizable. The dura and pericardium do not extend beyond the margins of the bony defect. Encephalocele is a protrusion of brain substance covered by arachnoid. There is no fluid in this form, save, rarely, where there may be a superficial cyst of the arachnoid. It only occurs in the nasofrontal region. In meningocele all brain tissue is absent. Beneath the arachnoid is a layer of cells of the same type as those lining the ventricles, but the communication with the ventricles is almost or completely cut off. In other words, a cyst forms in the subarachnoid tissue, and thickened pia surrounds the cyst. In no form of cephalocele does the dura play any part.

CONGENITAL SACROCOCCYGEAL TUMOR.

DR. ALFRED C. WOOD made some remarks upon the classification and pathology of congenital sacrococcygeal tumors as a preface to a report of a recent case, as follows:

A female child, two months and ten days old, was seen by him at the Charity Hospital, Norristown, Pa., in consultation with Dr. Charles H. Mann, and the family physician, Dr. George F. Hartman of Port Kennedy. Dr. Hartman furnished the following data: The child's father is twenty-three and the mother twenty years of age; both are healthy. The patient was the second child, the first being entirely normal. The labor began at 2 P.M., July 12, 1910. The head and shoulders were delivered at 3 A.M., July 13. Dr. Hartman was called at 10.15 A.M., and the delivery completed with great difficulty. A tumor was then observed attached to the sacrococcygeal region, measuring $19\frac{1}{2}$ inches in circumference, and $18\frac{1}{4}$ inches from the base anteriorly to the base posteriorly (Fig. 2); this subsequent to the birth gradually increased in size and the child became more emaciated.

The tumor was globular in shape; the overlying skin was very thin, but otherwise normal in appearance. The surface was somewhat irregular in contour, the larger portion having the characteristics of a cyst on palpation, but here and there small areas were felt that were firmer, and apparently solid. The coccyx could be felt on the posterior surface. It was curved backward instead of forward in the normal manner, and a firm,

FIG. 1.



Frontal encephalocele.

FIG. 2.



Sacrococcygeal cyst.

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narrow body like cartilage could be traced for some distance from its tip. The anal orifice presented on the anterior surface and was directed forward. The tumor evidently had its origin within the pelvis; it had no connection with the spinal canal.

As the tumor was enlarging and the child failing, it was decided to operate at once. Ether was administered, transverse elliptical incisions made, and the cyst enucleated. The cyst wall was closely adherent to the rectum from the anus to the level of the promontory of the sacrum, and some time was consumed in effecting its separation, which was finally accomplished without wounding the bowel or opening the peritoneal cavity.

When the incision was sutured, the anal orifice was drawn back into approximately its normal situation, and the general appearance was nearly natural. The operation was not accompanied by any severe hemorrhage, but the amount of oozing from the innumerable points of the large wound was probably greater than appreciated. The child appeared to be in satisfactory condition when it left the table, but death occurred a few hours afterward. Before the operation the child weighed 15 pounds and some ounces; after operation it weighed less than 7 pounds.

The tumor was composed of one large cyst, with thick walls; here and there areas of increased thickness were noted, some of which were small cysts, others were solid. The fluid was practically clear. Unfortunately, no minute study of the specimen was made.

DR. JOHN H. JOPSON reported the case of a girl about fifteen years of age, who had grown up with this condition, had attended school, had her clothing modified to make it as inconspicuous as possible, and had even ridden a bicycle. The reason her parents sought surgical advice was because one of the cysts had become infected. He aspirated one cyst and drew off considerable fluid. The growth was almost as broad as the buttocks, and rested on the thighs as far down as the knees. Excision was indicated and was suggested, although the operative risks would have been great.

DR. WILLIAM J. TAYLOR said that in consultation with Dr. Mary Griscom he recently saw a child a little over two months of age with a tumor very similar to that described by Dr. Wood. It measured $2\frac{1}{2}$ inches in diameter. As the child was apparently in perfectly good condition, and the mother very anxious to have something done, the child was etherized and he assisted Dr.

Griscom in the operation. The tumor was removed with little or no difficulty. On examining the tumor after its excision he found that there were portions of the coccyx and little cartilaginous masses through it. It was partly cystic, partly fat and fibrous tissue, and partly, he believed, sarcomatous. He did not dissect it carefully as he wished to hand it over to the pathologist, who now has it for examination.

Although directly next to the anus, the wound has healed by primary union. (Since the meeting Dr. Taylor has learned the growth was a teratoma.)

PARAFFIN INJECTION AS A CURE FOR INGUINAL HERNIA.

DR. ALFRED C. WOOD presented a specimen which had been removed from the inguinal region of a man aged fifty-five years. The patient was seen in consultation with Dr. S. H. Scott and Dr. Jackson Taylor of Coatesville, Pa.

The man stated that two years ago he had been induced to submit to an injection for the cure of a right inguinal hernia from which he had been suffering. Immediately after the injection, he noticed a large swelling in the neighborhood of the external ring, which has since persisted. The hernia was partially controlled, as it did not descend beyond the upper part of the scrotum afterward. The mass was about the size of a hen's egg, was freely movable, and could be pushed through the external ring into the canal with ease. The overlying skin was normal in appearance. One of the most annoying features according to the patient was the extreme mobility of the lump, which he said caused much more inconvenience than the hernia ever did. During certain muscular efforts, such as coughing, etc., the mass would be drawn up into the canal and forcibly projected downward. This action was plainly shown during the stage of etherization when the patient was breathing deeply; the lump moved upward into the canal and down like a shuttle with each respiratory cycle. The mass was excised. It was found to be in the loose connective-tissue layers of the cord and outside of the sac of the hernia. A capsule had formed by condensation of the connective-tissue layers about it. The sac of the hernia was removed, and the operation concluded according to the Bassini method for radical cure. Recovery was uneventful.

The specimen measured $5.5 \times 4 \times 3.5$ cm., and on section was found to consist entirely of paraffin.

CORRESPONDENCE.

VESICOVAGINAL FISTULA FROM PENETRATION OF FLOOR OF THE BLADDER BY HORN OF A BULL.

HATTIE M., a white girl, sixteen years of age, a patient of Dr. W. W. Wharton of Thomas, Ala., was referred to me April 22, 1910, with the following history: When about eight years of age she was gored by a bull, the horn entering the vagina and lacerating the sphincter ani and tearing the urethra open, the rent extending back into the bladder for several inches. She was living in the country at the time, and was attended by her family physician who attempted to suture up the wounds. She was confined to bed for about six months. Since the injury the urine has flowed out through the vagina, and her whole existence has been very miserable. She has some control of the bowels. Her general health is good.

Menstruation began about two years ago and has been regular and normal. By constant care she has been comparatively free from excoriation from the urine.

In the past few years several unsuccessful attempts have been made to close the bladder.

On admission to the hospital the urethra was found completely severed below and the defect extends back through the bladder and anterior vaginal wall for about two inches; three fingers can readily be passed into the bladder; the cavity of the bladder is large and seems to be about normal in size; the tissues about the urethra are retracted but moderately well developed.

The urethra and bladder were dissected up from the vaginal wall for about a quarter of an inch on either side well back beyond the inner end of the tear; the free edges of the bladder were turned up into the cavity of the bladder and brought together by a running mattress suture of No. 1 chromic catgut, beginning posteriorly and working forward; this suture completely closed the bladder and gave a good approximation of the ends of the sphincter of the bladder; this was reinforced by passing shotted silkworm gut sutures through from the vaginal side to the bladder only, turning the free edges of the vaginal mucous membrane into

the vagina; by this method of suture we had practically half an inch of freshened surface for union.

A soft rubber catheter was kept in the bladder for a week and was then removed and passed every three hours for a few days, when she began to void, having complete control between times.

The silkworm gut sutures were removed on the fourteenth day. She was kept in bed for a few days, and was then allowed to get up and go home.

She has had absolute control of the bladder since operation, and is in perfect condition a year after operation.

GASTON TORRANCE,
Birmingham, Ala.

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